First Copy

INDEX

THE MOTOR AGE

THE AUTOMOBILE AUTHORITY.

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THE AUTOMOBILE **Directory**

Will be a larger and more important work than had been thought possible. Makers are anxious to see that they are properly classified and the compilers are determined that they shall be. :: :: :: :: ::

The work will take longer time in preparation than had been allotted to it. The publication will therefore be **delayed a few weeks,** by which time the publishers will present a directory which will prove a surprise to the entire industry. :: :: ::

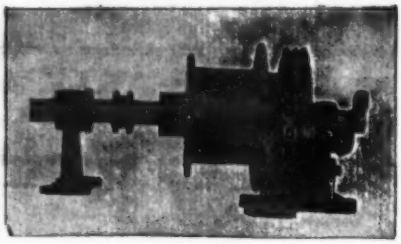
Makers who have not not yet sent in details of their productions are earnestly requested not to lose time in doing so. The work will be of vast importance to them before the year rolls by. :: :: :: :: ::

No change in the plans of distribution—free to annual subscribers, and to all others ONE DOLLAR. :: :: :: :: ::

THE MOTOR AGE,

Monon Building, - - CHICAGO, ILL.

Not a Puzzle



Which is the best Engine and Transmission, its easy, its the

BUFFALO GASOLINE MOTOR CO'S

Four cylinder non-vibrating mechanically operated inlet valves, and

EMPIRE GEARLESS TRANSMISSIONS

Only guaranteed transmission made

BUFFALO GASOLINE MOTOR CO.
10-20 Dewitt Street, ∴ ∴ Buffalo, N. Y.

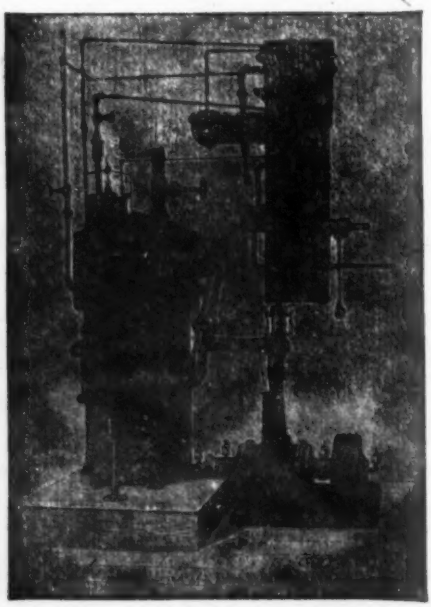
Proper Lubrication

Nothing is more essential to the proper service of any engine than lubrication. For automobile use specially adapted oils are necessary. The following meet every requirement for such use:

MONOGRAM GAS ENGINE CYLINDER OIL
MONOGRAM STEAM CYLINDER OIL
MONOGRAM ZERO LUBRICATING OIL
MONOGRAM MOTOR GREASE
MONOGRAM GEAR GREASE

For Sale at Supply Stations

Columbia Lubricants Co.
22 Burling Slip, NEW YORK



THE Garland

AUTOMATIC GAS GENERATING APPARATUS

FOR AUTOMOBILE FACTORIES

Any Capacity
Great or Small

In use in steam laundries with small requirements and packing houses using 300 gallons of gasoline daily.

Gas of required density without use of supplimentary air blast.
No condensation.
Vaporizes every particle of oil.

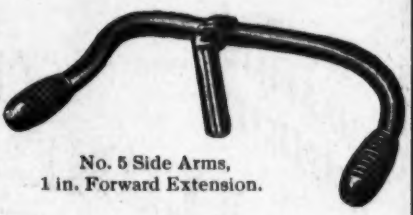
We shall be pleased to figure on the requirements of automobile manufacturers.

GEO. D. GARLAND, - 43 S. Clinton St., - CHICAGO, ILL.

1902 Kelly Adjustable Handle Bars

STANDARD BARS OF THE WORLD

No. 3 Arms, Regular Stem.



No. 5 Side Arms,
1 in. Forward Extension.

No. 4 Racing Arms,
2½ in Forward Extension

It will pay all manufacturers these times when competition is hot, to see that their wheels are equipped with just the attachments demanded by the rider. Every rider knows the merits of KELLY BARS, as they have been for the past six years the most popular and foremost sundry in the cycle trade.

The Kelly Handle Bar Co. CLEVELAND, O. U. S. A.

"Toledo"

SPECIFICATIONS:

Style—Model D.
Engine—Oil encased, 3 in. x 4 in. piston valves.
Boiler—Water tube.
Burner—19 in., with pilot light attached.
Water Tanks—Copper, holding 31 gallons.
Gasoline Tanks—Two of copper, holding 4½ gallons each.
Air Tank—Copper, tested 200 lbs. pressure.
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Air Pump—New design, automatic, attached to engine crosshead.
Throttle Lever—In combination with reverse lever.
Steering Lever—Side steering.
Gear—Flexible, 1¼ in. diameter, best seamless tubing.
Wheels—28 in. wire, nickled spokes and hubs.
Tires—28 in. x 3 in., single tube.
Upholstering—Best grade hand buffed leather.
Seats—Solid Panels.
Accessories—Lamps, bell, cyclometer, lock for throttle and tools.

MODEL D.

The trimest, least horsey, and by all considered the swellest horseless carriage ever manufactured. Possesses style, refinement and a certain degree of artistic taste in its entire make-up that wins it admirers at first sight.

PRICE, $1100

Send for "Toledo" Booklet. Sent Free Upon Application.

AMERICAN BICYCLE COMPANY
AUTOMOBILE DEPARTMENT,
TOLEDO, OHIO.
NEW YORK BRANCH, 91 FIFTH AVENUE.

THE CHEAPEST BECAUSE THEY GIVE THE MOST SERVICE

SPEED,
DURABILITY,
SIMPLICITY.

TIME
ALONE CAN TELL

DETACHABLE
DOUBLE TUBE
CORRUGATED

G & J TIRES HAVE STOOD THE TEST

G & J TIRE CO.,
INDIANAPOLIS,
IND.

CURRENT NOTES AND COMMENTS

The hill-climbing records, near Paris, reported last week, were not permitted to stand longer than was necessary to give the operators credit for having made them. On Nov. 26 they were attacked by Rigal, on a tricycle, and Truffault, on his racing machine. With a flying start Rigal ran up the 1,000 meters of 9 per cent grade in 42s., a speed of over 50 miles an hour, breaking the record by 4 4-5s. With a standing start he made 1:05 4-5, the former record being 4 seconds slower. Truffault, with his racing machine, made the hill in 58s. with a flying start and in 1:28 with a standing start, breaking the record for the latter, for voiturettes, by nearly 2 minutes. He then established a record for light vehicles on the level road of 1:09 4-5, a speed of over 50 miles an hour.

May Move the Trade Center

For the last two weeks a number of managers of automobile stores in Chicago have been discussing the advisability of removing the headquarters of the trade from Wabash avenue to Michigan avenue and 14th street. There is, on the northwest corner, a building which can accommodate about eight branches and the managers in question have secured an option and expect to reach a decision in the matter in a few days. If the move is made the Winton store will be one of the lot. Across the street, on the southwest corner, there is another building which can probably be obtained and the promoters of the plan have an eye on it in the event of an overflow of applications for room in the neighborhood. The movers are actuated by three considerations; first, the high rent demanded in the present location; second, the heavy traffic on Wabash avenue, and third, the desirability of Michigan avenue.

Exhibition at Copenhagen

An exhibition is to be held at Copenhagen, April 11 to 27, inclusive, under the management of the Danish Automobile Club, which announces that there will be no charge for space and invites all manufacturers to exhibit. The object, it says, is to show the people of Denmark the progress made in the art and to interest them therein. The show will be held in the building of the Society of Industrial Arts. The material, show cases and tables of the society will be at the disposal of exhibitors, insurance will be provided free and exhibits will be admitted free of duty, but must be taken out of the country at the close of the exhibition.

The exhibitors will thus have to pay no expenses but the transport to and from the rooms, the unpacking, setting up, taking down, repacking and any particular tending or cleaning, demanded for their articles.

During the days of exhibition, open to the public some hours every forenoon and a few evenings, the articles exhibited must be kept in place. At other times the exhibitors are at liberty to drive their machines on the boulevards surrounding the place of exhibition. Applications, etc., should be addressed to Industriforeningen, Copenhagen, B., before Jan. 15.

Local Show at Indianapolis

Indianapolis is to have a local show of cycles and automobiles. This was decided at a meeting of dealers on Friday last. The show will be held at the Cyclorama building, during the third week in February, the space available being 15,000 feet. The dealers subscribed to a guarantee fund of $900 and elected Frank Staley chairman, Carl G. Fisher secretary-treasurer and A. C. Newby, chairman of the executive committee, other members of the committee, beside the officers, being H. O. Smith and George Deitch.

New Allotments at Chicago

The Chicago show grows apace. On Monday the Searchmont company obtained the last large space in the building. It contains about 800 feet and is directly across the building from the main entrance. The only track spaces now remaining are four, with a frontage of 15 feet apiece, but none of them adjoining. The Friedman Auto-

mobile Co., Geneva Automobile Co., Chelsea Mfg. Co., Brandenburg Bros. and Frank Glover are other makers of automobiles to be added to the previous lists. The management will probably have something to say about railroad arrangements within a week. It expects to secure a reduced rate in central and western territory, at least.

Chicago Automobile Club's Smoker

The best meeting the Chicago Automobile Club ever held was that at the Sherman House last Thursday evening. About forty members were in attendance and only a few minutes were devoted to the more pressing matters of business before the club. The president had not, up to that time, received an answer to the club's letter to the A. C. A. on the subject of "affiliation," or the formation of a national association. Show matters were reported to be booming.

Then came an informal entertainment which seemed to please the members greatly and which is expected to prove a drawing card on all future occasions. Better still the club obtained several new members by the event. Professional talent had been provided for several musical and other numbers and members contributed largely to the pleasure of the occasion. The club will probably hold a similar meeting early in January. The annual meeting and election occurs about a month hence.

To Adjust Automobile Risks

The leading casualty companies are considering automobile risks and are expected to adopt a schedule based on the safety precautions taken by makers. It is asserted that "reforms in automobile building" are likely to follow the publication of this schedule. Perhaps so, but unless the commisioners are open to conviction and consult with the men who have been making gasoline vehicles for years the schedule is likely to be anything but a thing of beauty and far from a guide to makers, who, it may safely be asserted, know a great deal more about the safety appliances necessary than do the commissioners.

Gathering the Minneapolis Mail

The trials of the postal automobiles in Minneapolis have been a success. Snow and mud will cut no figure in their use. This is the decision of Marc Wanvig, superintendent of delivery, after a test of one route and the greater part of a second. Mr. Wanvig had a machine inferior to those that are to be used in the regular work, yet he believes that his trial trip was entirely successful. Mr. Wanvig, in company with a collector, did about 8 miles an hour, including stops at sixty main boxes where collections of mail were made. Each of the new routes is expected to require about one hour and a quarter.

The length to which some French automobilists will go is illustrated by the fact that Baron Edmond de Rothschild has had made an 8-horsepower delivery wagon, to carry flowers from his castle, near Paris, to his residence in the city. The cost of the vehicle was $3,000. The interior is heated by the water used for cooling the motor. Formerly horses were used, but it took them two days to go and return and three men were needed. Now the trip is made in a day.

The French paper L'Auto Velo says that while it is very interesting to know that such and such a man made a great record, the performances depend, after all, on the motors used and it believes suitable recognition should be given to the makers. It will, however, award a gold medal at the end of each season, to the holder of the best average speed per hour over a distance of at least 1 kilometer.

The French government refuses to authorize automobile races during the Grande Semaine at Nice, in April. The mayor of Nice was officially advised on Wednesday to that effect. All mayors of communes and prefects of departments on the route of the big races had given their consent, so the government's decision creates surprise.

Enrico Mangini and two companions recently ascended Mount Figogna, in Italy, over a bad road with a grade in some parts as high as 30 per cent. He used an Italian vehicle known as the Fiat, of 8 horsepower.

Thirteen hundred owners of automobiles have registered with the New York state authorities under the new law. The number furnishes an illustration of the remarkably rapid growth of the industry.

NEW INCORPORATIONS AND ENTERPRISES

A third automobile plant is to be added to the industries of the classic town of Kokomo, Ind. The two already there are the one owned by the Haynes-Apperson Co. and the new one of the Appersons. The latest is to be erected by the Standard Mfg. Co., which was organized by local men last week, with capital of $50,000, to succeed an old concern making other lines. It is their intention to make a cheap vehicle and to call it the Go-About. It will not resemble the machines now made in the town except that it will be propelled by a gasoline motor. The officers of the company are as follows: E. G. Shortridge, president; S. J. Myers, vice president; W. P. Sellers, secretary; W. D. Irwin, treasurer; A. W. Holcomb, Jesse Haines, G. C. Yowell, of Indianapolis, and the officers named above, directors. The capacity of the plant, now operated in a limited way, will be doubled at the start. The first force of men employed will be twenty-five. The plant includes the machine room, the enameling room, pattern department and blacksmith shop and is equipped with a well and its own water-works system. The former company did an extensive business in the sale of gas and gasoline engines and the sale of these goods will be increased.

Loomis Wants to Extend

George J. Loomis, who has been making automobile parts at Springfield, Mass., finding that the business had grown beyond his financial ability, made a proposition to the board of trade of his city, which was considered at a meeting held last week. He proposed to organize a company with capital of from $30,000 to $50,000 and agreed to take $10,000 worth of the stock for his business. The members of the board have the proposal under consideration and seem to think favorably of it.

In remote Harney and Malheur counties, Wash., automobiles are taking the place of the old-fashioned stage in the long runs into the interior. Two autos will shortly be purchased to make the 160 mile stage trip between Ontario, Malheur county, and Burns, county seat of Harney. Here a lumbering stage makes the run in 36 hours, delaying the mail of Burns business men and residents. P. A. Snyder, an Ontario man, will have two automobiles on this arid route shortly, which he calculates can make a daylight run in 11 hours.

W. J. Pugh, of the firm of Pugh & Bofinger, Davenport, Ia., was in Chicago last week to buy machinery, to add to the firm's plant for the manufacture of automobiles. It is stated as the intention of Messrs. Pugh & Bofinger to manufacture automobiles on a small scale for a year. They are of the opinion that after they manufacture a number of automobiles they will be in a position to solicit capital for the establishment of a large factory in Davenport.

The Frank Bird Transfer Co., of Indianapolis, which, as related last week, will run a line of electric cabs for the people of that city, has decided to install its own charging plant. The outfit consists of a 75 horsepower gas engine and two dynamos. The whole will be ready for service in about ten days and the running of the cabs will then commence.

Dr. J. H. Wilson, Hon. W. Clay Huston, A. J. Miller, N. V. Elliott, Charles C. Kuert, John N. Gregory, Will R. Niven, W. W. Fisher and Ray F. Tremain, prominent men of Bellefontaine, O., and George K. Miller, of Kenton, have formed a company for the purpose of manufacturing storage batteries, automobiles, electrical appliances and instruments there. The capital stock of the company will be $20,000.

There have been many threats to operate automobile lines in competition with street car companies which refuse to give people the accommodations to which they imagine themselves entitled. The latest is at La Crosse, Wis., where "some of the wealthiest men in the city" are interested in the plan.

The Niagara Motor Vehicle Co., of Buffalo, with capital of $25,000, intends to manufacture and deal in motors, dynamos and

batteries, gas and steam engines, etc., and motor vehicles and electrical supplies. Three of the five directors for the first year are Buffalonians. The list is as follows: Charles F. Stone and William A. Weed, of Binghamton, Robert S. Weed, Helen I. Slater and Charles A. Lindstrom, of Buffalo.

The New York Tire Co., Limited, has been registered in England with a capital of £10,000 to carry on the business of manufacturers and vendors of, agents for and dealers in rubber and other tires for cycles, motor-cars and vehicles, and the business of cycle and motor-car builders, engineers, rubber merchants, etc. The registered office is at Thavies Inn, Holborn, London. Incidentally it may be remarked that one hears more of this company abroad than at home.

The Menges Engine & Mfg. Co., Louisville, Ky., has been registered, with the following incorporators: A. C. Menges, W. E. Graves, J. S. Moody, N. Nelson and A. L. Cross. The capital stock is $5,000 and the company will manufacture gasoline engines, automobiles and electric light plants.

The Newark (N. J.) Auto-Coach Co. has received the first of its Columbia electric vehicles and will shortly commence to carry passengers. James Mills is the manager of the new company, which has established a charging plant of its own at the cycle store of the manager.

The stockholders of the Franklin Mfg. Co., of Syracuse, have authorized an increase of the capital stock from $100,000 to $250,000 and an extension of the business to include the manufacture of automobiles and articles pertaining thereto.

Overall Bros., Alexandria, Tenn., would be glad to place an automobile in service on the stage line between Watertown and Smithville. They are investigating vehicles.

J. C. Reuter, described as the owner of numerous automobile patents, is in Quincy, Ill., trying to organize a company.

W. O. Hadley is at the plant of the National Sewing Machine Co., of Belvidere, Ill., preparing a gasoline engine for automobiles. The company is still unwilling to furnish details of its plans.

Greencastle Automobile Co., capital stock, $25,000. Directors, H. S. Renick, Quinton and Charles Broadstreet, C. M. Bell, G. E. Blake, Alfred Hirt and S. A. Hirt.

The Bartholomew company, Peoria, Ill., has finished a gasoline vehicle weighing about 900 pounds. It expects to sell its vehicles at $750.

The factory at New Castle, Ind., announces that it will have a vehicle in operation by the first of the new year.

An automobile factory has been started at Birmingham, Ala.

Items of Commercial Interest

Anti-friction oil is the brand which E. H. Kellogg & Co., of 475 Water street, New York, have given to an oil for automobile uses. This oil is being used by several manufacturers and is said to preserve the metal, afford ease, smoothness and regularity of motion and will not carbonize. As the oil is suitable for all kinds of external and internal lubrication, it takes the place of the two or three oils which are usually carried.

The postoffice at Utica, N. Y., has just made an automobile mail collection test. The machine beat the horses 35 minutes over a route which usually occupies 2 hours, and this despite snow and slush. The local press urged further tests and the adoption of the machines if they continue to operate satisfactorily.

In the opinion of the board of public works of San Francisco, automobiles should be subject to the same license regulations as other vehicles when used for similar purposes, but it does not believe that any good will be accomplished by requiring chauffeurs to pass an examination.

Changes have been found necessary in the Omaha vehicle now running between Sheridan and Buffalo, Wyo., the power being insufficient for some of the hills with a heavy load.

THE AUTOMOBILE FOR HEAVY DUTY

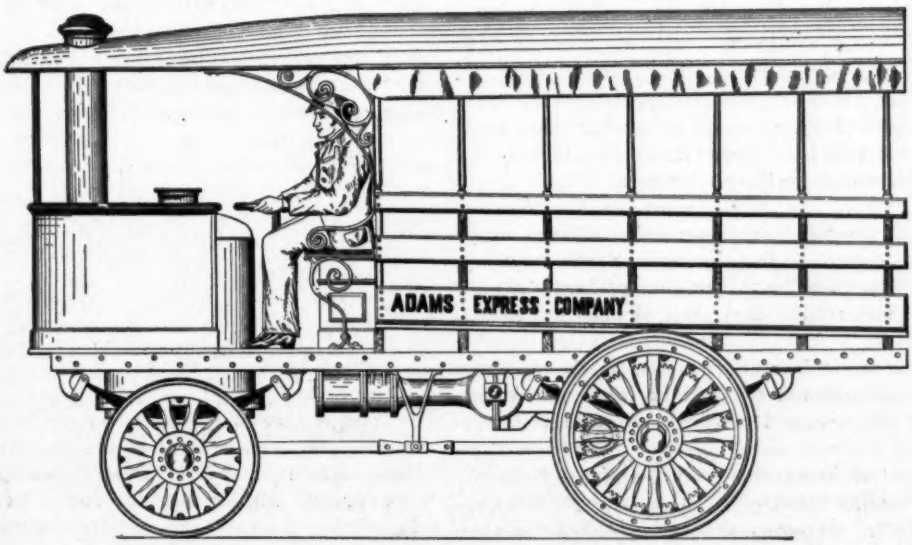
NUMBER ONE.

In a paper read before the manufacturers' association during the late show at Madison Square Garden, one of the speakers made the assertion that one of the express companies, which had done a great deal of experimenting with motor vehicles, though as far as might be without attracting the attention of the world to the fact, had been inundated with inquiries as to results, cost of operation, and so forth. The company referred to was the Adams Express Co., whose representative, Arthur Herschmann, traveled all over Europe seeking light on the subject. As a result of these exhaustive inquiries the company adopted steam as the proper form of power and Mr. Herschmann prepared and read before the American Society of Mechanical Engineers a paper on the subject, of which a copy has been furnished MOTOR AGE by Edwin W. Adams, of the company, for reproduction for the benefit of its readers. The paper deals exhaustively with the subject and will be presented in two or more parts, as space may permit. Mr. Herschmann says:

It can easily be proven that the progress of civilization made by all nations has been closely interwoven with the progress of transportation. In olden days men were well satisfied to live, grow, and end their days wherever destiny planted them. There they established themselves, contented with the pursuits of life which were within easy reach, looking to nature for their maintenance, and buying and trading with their immediate neighbors, and within narrow bounds. It would be outside the scope of this paper to discuss whether life was then less comfortable than it is today, and whether the few commodities then obtainable were insufficient to make existence enjoyable.

At the present day our needs are considerable, varied, and ever increasing. It is no exaggeration to state that many a person's happiness is marred for a good many hours if an express package containing personal goods coming from a great distance should not arrive on the hour.

We all know how an improvement in the facilities for rapid passenger transit shifts the centers of districts where people congregate to manufacture, and the districts where they gather to live. Towns prosper or decay according to transporta-



tion facilities, and the value of real estate is seriously affected by them.

The manufacturer and the farmer know what it means to buy and sell where the opportunity is greatest, and how important the item of a quick, safe, and economical transportation of their goods has become at the present day, when the fluctuations in the value of raw material have become an ever increasing factor in the cost of the finished product.

Traf ic Begets Traffic

Before the advent of the railroad overland transportation was limited to the public highways. Washington maintained that the future prosperity of the country would depend on more horses and national roads, and it can be well said that his prediction has been fulfilled if we only substitute for the word "horse" the words "motive power." When, long after Washington's days, the locomotive appeared, the prevailing idea was that there would be little further use for horses and that all traffic would soon be handled by steam roads. It was different. The fact became apparent that traffic begets traffic, and that the increased opportunity which the railroad presented stimulated local enterprise and necessitated the employment of more horses and wagons to ply to and from railroad stations. It can be safely stated that the amount of merchandise hauled by horses on our streets and over short distances is as great in the aggregate as that carried by the railroads over long distances.

Future of the Horse

The advent of the bicycle and of the electric trolley car characterized similar periods of apprehension on similar lines, and yet statistics show that the number of horses in use has so far been little affected. (Horses in United States on January 1, of the motor carriage this increase may now be checked, to give way gradually to a diminution in the number of horses used. Some enthusiasts have already predicted that it will be only a few years before there will be no horses on the streets. This sanguinism is not justified. However, while the horse will continue to remain man's best friend among the brute creation as a saddle horse, and will probably never be wholly substituted in the propulsion of fancy carriages, there can be little doubt that the motor freight vehicle has come to stay and will eventually supersede the horse as a beast of burden. It will evidently be a question of some time and evolution before it will become a universal institution and of the greatest importance to transportation interests.

Early Efforts of Builders

The motor wagon presents a problem which should admit of no prejudice. It is a case free from sentiment, and merely influenced by economic considerations. The elements constituting in principle a successful motor vehicle were known and experimented with by enterprising engineers some 80 years ago. The reasons why those experiments did not lead to results are not far to seek. It was then the time of railroad development, and the new competition from the railroad did not encourage costly experiments in a competitive line. Furthermore, the machinery used in the motor carriages was in a crude and undeveloped state. The revival of the movement, which may be said to have begun not more than 10 years ago, has met with a great deal of indifference and prejudice. It has been contended that these wagons would frighten the horses, while we can say today that most horses soon become accustomed to the peculiarities of their new competitor. Most of this opposition has come from prejudiced quarters; many of the opinions have been voluntered by persons who have never ridden in a motor carriage, and whose remarks were intended for consumption by the home circle. The advantages of any kind of self-propelled vehicles are patent to any one who stops to give the matter unbiased thought. One has only to think how quickly a motor wagon with its reduced length can thread its way through crowded thoroughfares, and how it thus saves road space which is at present occupied and made dangerous by the oftentimes erratic horse.

The smell caused by the worst of the present day vehicles is not as bad as the smell emanating from horses with which we have to put up in hot weather.

The Need of Good Roads

It may be contended that the heavier weights supported by the largest types of motor wagons will damage the roads, but this can be proven to be a fallacy since

even if such damage did occur it would be more than outbalanced by the pounding and tearing action of the horses' hoofs.

One of the necessities for the successful running of motor vehicles, for some time to come, will be a good road surface, and those responsible for the maintenance of public roads could well afford to encourage the new movement, seeing that by the use of motor wagons a considerable saving will be effected in the matter of street cleaning, let alone the improvements in the hygienic condition of the roads.

The matter of safety has often been doubted, and, while we will consider it later when studying the characteristics of different systems of motor wagons, it may here be said that statistics have already shown the new vehicle to be far safer from accidents than the horse drawn vehicle.

Comparison of Danger

At times the horse will stop of its own sweet will, and refuse to budge, but, in case of emergency, using his best efforts he could seldom pull up from full speed inside of less than 30 yards. It necessarily takes time to communicate the driver's will to the horse's brain, and from there to the horse's muscles. A motor wagon, on the other hand, can be quickly stopped, as powerful brakes are within easy reach of the driver, whose intelligence alone is challenged in case of emergency. In addition, the driver of the motor wagon will have a clear view of the road ahead without being perched high in the air. It is very difficult to avoid an accident with a horse-driven wagon should the pole chain break, and it is naturally most likely to break when it is most wanted, i. e., when suddenly pulling up.

There is another important item which is strongly in favor of the motor wagon as compared with the use of horses. Horses are dependent on the weather. Flies molest them in summer time, and the driver is often led to believe they are sick or tired, and will naturally slacken up for fear of straining them. Climbing a steep hill he will often get off the wagon to save his horses, and it is evident that this all interferes with economical transportation.

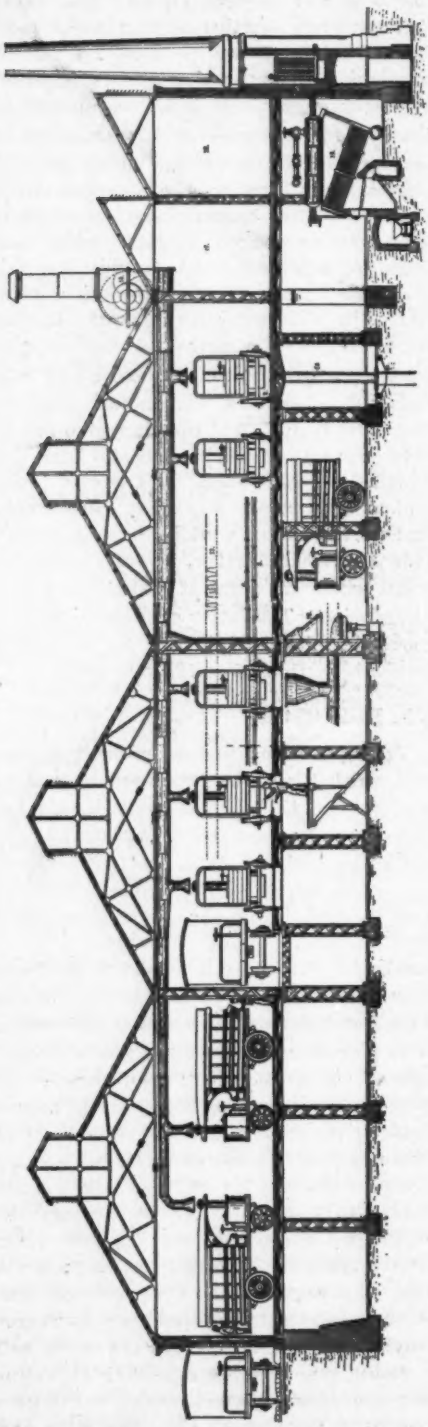
Economy of Operation

We have briefly touched the matter of brakes, and this really is the nucleus of the speed question. We need only consider the speed of modern railway trains and ask ourselves whether such a speed could be safely maintained without the use of air brakes to approach the speed question of motor wagons. It is an easy matter to provide for powerful brakes on a motor wagon, and the propelling motor lends itself in many cases as a very powerful second brake. We have found that a load of three tons on a motor wagon, running at a speed of 8 miles, could be pulled up in 8 yards, a performance which could never be obtained with horses. It may have escaped the notice of the onlooker that when we speak of an 8-mile gait with horses it should be asked, how long can they keep it up? And then it should be considered that it would probably only approximate a 5-mile gait of a motor wagon, which latter never gets tired, runs evenly, and is ready to do work as long as we provide fuel, and, further, is satisfied to remain where we leave it when put out of commission. The latter consideration is an economic advantage not to be overlooked in the operation of motor wagons.

The Early Trials

Taking up the different propelling agencies which have been experimented with so far, we find that almost every known motive power has been tried. Steam was employed as early as 1820, and such wagons were built by the world renowned Ericsson and Tangyes in England, and even James Watt is said to have constructed a steam carriage. With the low steam pressures then available, poor roads, and difficulties with unreliable material and workmanship, it is not surprising that the matter was allowed to drop. The next experiments were in the line of oil engines, followed by electric vehicles, compressed air, carbonic acid and the revived steam carriage.

Naturally, in this country, leading the world in electrical subjects, expectations were greatest with electric vehicles. The electric equipment renders a vehicle clean and easy to operate. These vehicles can be made to answer the requirements of running on smooth city roads. The suitable commutation of battery cells provided in these vehicles, effected through interconnection of contacts on the "controller," affords, together with the series and multi-



Mr. Herschmann's Idea of a Wagon Shed.

ple arrangement of the motor, some flexibility in the power and speed conditions of the machine. There are, however, inherent disadvantages to the use of batteries, which grow prohibitive in a motor wagon intended to carry heavy weights over a long distance. It is common experience that on rough roads the punishment is more than the batteries can stand, and where we have a case of heavy loads to be carried, necessitating the use of steel tires, we can well say that at this phase of the evolution the battery makes the electric truck an impossibility. It would lead too far to enter minutely into the matter of cost of operating electric wagons, but it may be stated that the best traction cell has only a capacity of about seven watts per pound of its weight, and with this as a basis, one can soon calculate how much dead weight a wagon would have to carry to propel a big load over a long distance with one charge. The "maintenance" of batteries, apart from the actual cost of charging, is seldom spoken of, though it is perhaps the most serious item.

Auto-Truck Failure

Next to the electric wagon we saw the auto-truck, or, better still, heard about it. It was stated that compressed air trucks would soon be operated in considerable numbers. Now, while it cannot be denied that compressed air would make an ideal motive power, we have still to look for a complete revolution in the construction of light storage tanks to render this power available for trucks, granting that other disadvantages inherent to the use of compressed air can be practically overcome. Weight for weight, stored electricity lends itself more readily to the propulsion of wagons, since it will, as it were, "keep pressure" until it becomes well nigh exhausted, while the air pressure falls gradually as the air is drawn from the storage tanks. The tank weight per cubic foot of air is about 85 pounds; the air itself weighs 11 pounds, and at 2,000 pounds per square inch, represents 0.27 horse-power hours. To heat the air, considerable weight has to be carried.

It has been proposed to compress illuminating gas, and use it for the propulsion of gas motor-wagons. While the radius of the operating district for such a vehicle would

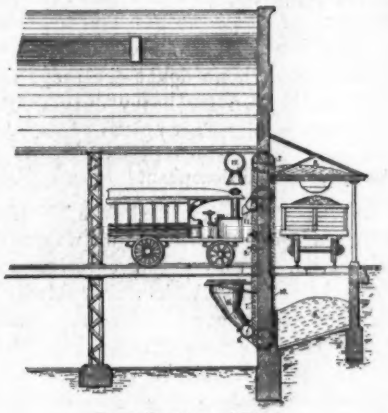
be evidently greater than with the other storage systems, seeing that about 18 feet of cubic gas at normal pressure would already give one brake horse-power, whilst about as many cubic feet of air of 200 pounds pressure, or of carbonic acid of a high pressure, are required. This system has, however, the disadvantage of seriously complicating the mechanism.

Carbonic acid has also been proposed for the operation of wagons, but it suffers in common with compressed air, and, moreover, the raw material to be compressed is by no means cheap.

A great deal of experience has been gained with oil-motor wagons, though chiefly in the light of light pleasure vehicles; and France, in which country there are many thousands of these vehicles plying, has led the world in their exploitation.

Gasoline Vehicles

As regards freight vehicles, however, no important results have been obtained with the use of explosive motors. A motor wagon, on account of its great weight and peculiarity of operation, must have an abundant supply of power; so great, in fact, as to puzzle the uninitiated observer. We find that a load which can be easily negotiated by one horse, calls for a power equipment equal to about 14 horse-power on the part of a motor wagon. While we commonly understand that 1 horse-power equals 33,000 foot pounds per minute, we should consider how great the work of a horse can be for a short while on the race track, or when he becomes infuriated, and with "blind staggers" dashes into destruction. A horse, when required to pull a heavy load out of a difficult position, will not only jerk and lift the shaft so as to bring the wheels out of a rut and get them on a level, but will momentarily exert power which has been, by means of a dynamometer, shown to be adequate to a performance of what we commonly call 14 horse-power. Some people, in fact, assert that the horse can for an instant by far exceed the latter figure, but we may be well contented to accept this as a basis of calculation for the supply of motive power. The same horse having pulled his wagon out of the difficult position, is able to modify the output of his energy, propelling the wagon at a good rate of speed as soon as he reaches better ground. The "speed-changing device," which should as nearly as possible emulate the peculiarity of the horse's muscular system, is still the greatest problem with designers of oil wagons. The most ingenious devices have been already tried with a view of filling this gap, and with more or less success; they consist chiefly of such elements as spur and bevel gears, belts, chains, shifting wheels, expanding pulleys, or combinations of some of the above devices with brakes and clutches. Even hydraulic and electric combinations have been unsuccessfully tried. An oil engine to run a motor wagon cannot well be designed to vary in speed, at least not in a wide range, and be satisfactory in other respects. Its construction necessitates its running at a constant speed,



Cross Section of Shed.

whilst the speed requirements of the wagon wheels, to which it is geared up, are ever changing. Clutch and shifting gear wheels are, therefore, essential parts of every oil-motor wagon, and their operation, on account of the impact of the moving masses, often gives rise to serious trouble. Non-reversible, an oil engine is by no means a flexible motor. It will not start under load, and when it is in running condition it is very dependent on an even influx of its explosive mixture, and is liable to come to a dead stop without warning when its capacity has been suddenly overtaxed. Anybody who may have gotten stuck with a motor vehicle while ascending an incline will appreciate these remarks. In such a case it will occur to him that it is very difficult at the same time to release the

brake and start the wagon "ahead" on slow speed. It need hardly be said that an oil vehicle is dependent on the weather, inasmuch as the action of the carburetor is influenced by the atmosphere. This latter idea leads to the subject of perfect or imperfect combustion and its attendant outward sign, which is an evil-smelling exhaust. The good behavior of large oil engines on heavy trucks after an extended period of running has not yet been satisfactorily proven, and the deterioration due to the pounding on the frame is a serious drawback. The general use and handling of large quantities of gasoline at this stage of evolution of the oil engine is by no means free from risk of explosion, and there is some danger of affecting perishable goods and foodstuffs by the odor, which would naturally permeate them, particularly while standing at the express company's depot. (If it were possible to make a practical success of an oil motor wagon, using crude oil, no doubt the scope of the oil motor wagon for heavy duty would be considerably increased.)

Steam Wagon Triumphant

Having thus described the difficulties with which the electric and oil wagons have to contend, we may devote ourselves to the steam wagon, with which, undoubtedly, important results have already been obtained. Before entering into the technical details of the steam wagon, it would be well to consider the problem from an economic and managerial point of view, since it seems that with the best constructed motor wagon, propelled by any power, the technical aspects are still subservient to the commercial. We have found the steam wagon superior to its competitors for the following reasons:

1. It has the greatest load and mileage capacity, or, in other words, radius of action.

2. Its operation is independent of charging stations, and supplies, necessary for the operation of the wagon, can be easily procured and taken abroad quickly.

The operating expenses in the case of an electric (or, in fact, of any power storage system) vehicle, grow to be prohibitive as soon as a certain ton mileage capacity is exceeded, tending to keep such an electric wagon small in size.

In the case of an oil wagon such economic restrictions to the size do not exist, and the objections to an oil wagon of large capacity are more by virtue of difficulties in operation.

With steam the case is altogether different. The tendency is here to build a large wagon, since with a steam wagon the weight of the machinery to be carried does not grow even in an arithmetical ratio to the carrying capacity. One advantage found in the operation of a large steam wagon may not be apparent to the casual observer. In the case of the horse-drawn wagon one has to discriminate in loading it with goods which are to be delivered only on the exact route covered by the wagon, seeing that the daily carrying capacity of a horse is limited, while in the case of a large steam wagon this would be less important, since, as will be shown later, the percentage of operating expense due to the actual cost of propulsion proper is infinitely smaller than in the case of traction with animal power.

When I submitted my first report to the Adams Express Co., to whom I stand in the relation of mechanical engineer, in 1898, on the progress made on motor wagons, it was my opinion, that there had been, up to that date, nothing constructed likely to form a suitable substitute for a horse-drawn wagon but a steam propelled vehicle. President L. C. Weir then remarked that there seemed to be less difficulty in constructing such a wagon to do the work of two horses than to construct a successful substitute for a one-horse wagon, and I believe that the data, which I intend to give later on, will convince you of the correctness of this opinion.

NEW YORK NOTES AND COMMENTS.

New York, Dec. 9.—All is evidently not as smooth sailing for the Automobile Club of America in its affiliation scheme as was anticipated. Stories that all of the thirty-seven "recognized" clubs invited to participate in the affiliation are not disposed to accept, without protest, the positoin taken by the club as the national organization, and to consent to agree to abide by rules formulated and presented to them, have doubtless reached the ears of the governors. The draft of the proposed affiliation agreement has been subjected to constant tinkering and changes. Saturday your correspondent was told by the law committee that the document was finally completed, but could not be given out until it had been submitted to the governors at a meeting to be held on Tuesday. This morning, however, the member of the law committee having the matter in charge, telephoned President Shattuck in reference to the date of the meeting and was told that he would call a meeting in two or three days—a very indefinite reply.

* * *

The position taken by the Automobile Club of America in the matter of the racing rules is that it is the national organization because it is recognized as such by all the foreign national associations; that it has entered into a compact with them to enforce the rules governing international contests; that it has already participated in the framing of these rules and that its national prerogatives cannot be disputed until some other organization is formed and receives foreign recognition.

* * *

The Long Island Automobile Club takes practically the same ground as the Chicago Automobile Club. In fact, the argument of the entire opposition is that it is un-American to be asked to obey rules without voting privileges in their framing and that the Automobile Club of America, though the pioneer, is merely a local organization, even though it has an outside associate membership of fifty, as against a New York role of three hundred. Its leading members declare that the club stands ready to send delegates to a convention, no matter at how far distant a point the meeting may be held.

* * *

The Automobile Club of America is noncommittal as to its willingness to join with the other clubs in forming a national association. The outside clubs believe that there can be no effective joint action by the clubs of the United States otherwise than through the formation of such an association. It is surmised that the Automobile Club of American governors are delaying the promulgation of their proposed agreement until it can be put in such a form as to receive assurances that it will not meet with rejection by a majority of the clubs. There seems, however, to be little chance that it will resign the foundation claim of national functions until foreign recognition of another American body be forthcoming. There seems, however, to be no bitterness in the contention, and it looks as though due recognition of the prestige and pioneership of the Automobile Club of America would be accorded in the event of the New York Club joining in forming the proposed association.

* * *

The new racing rules of the A. C. A. were formulated last week. They failed, however, of receiving much serious attention in the present unsettled condition of the question of the body that is to have control of the racing next season. All the points covered by them have already been forecast and fully discussed. The amendments and added rules are as follows:

Rule 53 is amended to read: Once in the hands of the starter, no automobile shall receive any further care, except from its driver or his assistant.

The following new rules are adopted: In record races and contests, automobiles shall be classified according to weight.

Bicycles, tricycles, and tandems shall not compete against four-wheel vehicles.

During the running of a contest or record race, the driver must have exclusive control of the steering and power of his automobile.

No time shall be considered official unless the time is taken by an official of a recognized meeting, or by one appointed, subject to the approval of the racing committee.

* * *

Racing automobilists are becoming skeptical as to the probability of the unfinished time trials of the Long Island Automobile Club being run off after all. It is winter now and Christmas is near at hand. To get together the entries again for more time trials would seem to be difficult under the circumstances, even if consent to use the selected course. Mr. Pardington, of the L. I. A. C. committee, however, still seems sanguine of success. "It is much harder, though," said he, "to get the consent of a whole board of supervisors and a lot of highway commissioners than to obtain the permission of Commissioner Brower, of Brooklyn, who was the whole thing and not an elective officer.

A Club in South Africa

W. N. Jenkins, of Cape Town, a dealer in automobiles, agent for Crescent bicycles and a subscriber to this paper, sends an account of a meeting held by the automobilists of his city. "Being a constant reader of MOTOR AGE," he says, "and knowing that news is welcome, I enclose a report of our first meeting of the Automobile Club of South Africa. The membership is necessarily small as there are few enthusiasts as yet, but the club will soon become eminent and flourish, as many automobiles will be brought to this country shortly."

The adjourned meeting of the Automobile Club of South Africa, says the report referred to, was held at the office of the secretary and treasurer, A. C. Fuller, Bureau street, last Friday evening, when the following officers and committee were elected: Vice presidents, J. P. Fitzpatrick, H. M. Arderne and A. T. Hennessy; secretary and treasurer, A. C. Fuller; club committee, J. H. Shilletto, Dr. Arderne Wilson, B. Bartholomew, and W. M. Jenkins.

The following extracts having reference to the aims and objects of the club and its control of members' driving may be of interest:

This club shall be called The Automobile Club of South Africa, and has for its objects the encouragement and development in this country of the motor and other allied industries, supplying to its members a, when practicable, social club and a center of information and advice on matters pertaining to motor vehicles, and for affording to them its support in the protection and defense of their rights wherever menaced.

For this end the leading characteristics of the constitution of the club are:—(a) That it shall be essentially a members' club; (b) That it shall be conducted independently of any personal interests; (c) That the club shall seek to obtain special trade discounts and other advantages for its members in the purchase, etc., of motor vehicles, etc.; (d) That the club shall afford members information and advice connected with the movement; (e) That members shall have access to periodicals and other literature pertaining to the industry; (f) That the club shall endeavor to make arrangements for the storing of members' motor vehicles, etc.; (g) That lectures and discussions shall be held; (h) That the club shall watch the progress of automobilism, and generally protect and encourage same; (i) That the club shall cultivate reciprocal relations with kindred institutions in other countries; (j) That the club shall organize from time to time tours and excursions for members and their friends; (k) A distinguishing badge may be issued every year to members, in order to facilitate recognition as active members of the club to be fixed by the club committee.

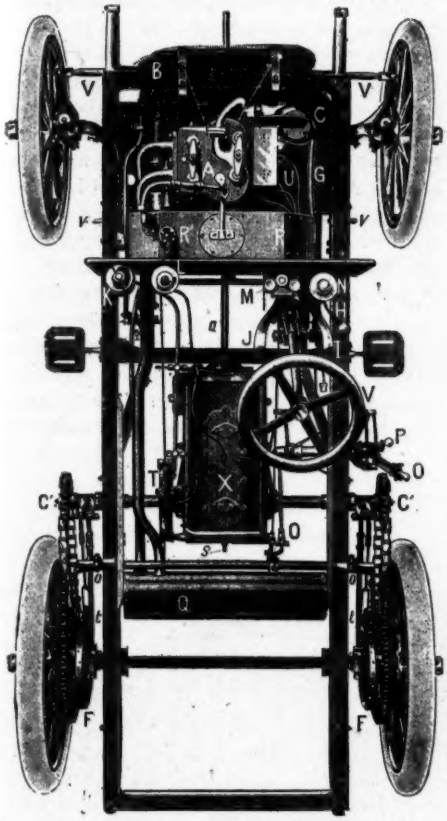
Members hold themselves bound in honor in all cases of dispute or disagreement, as to the interpretation of the rules and regulations of the club, to acept the decision of the club committee as final and binding.

In the event of a grave breach by a member of the rules and regulations of the club, or of conduct on the part of a member rendering it desirable that he should cease to be a member, the club committee shall have the power to pass a resolution of expulsion.

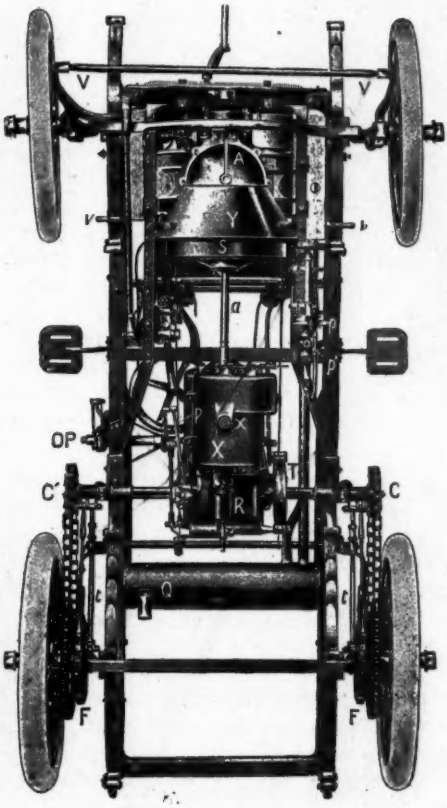
In the event of any member being in the opinion of the committee guilty of reckless driving under circumstances involving conduct which the committee may consider unsportsmanlike or ungentlemanly, or prejudicial to the interests of automobilism, he shall be called before the committee, and failing a satisfactory explanation, he may be cautioned or suspended, or required to resign his membership.

THE NEW LIGHT PANHARD CARRIAGE

PART ONE. TRANSLATED FROM LA LOCOMOTION.



LIGHT PANHARD CARRIAGE.
(Plan of upper face.)



LIGHT PANHARD CARRIAGE.
(Plan of lower face.)

A, Motor. *a*, Connecting shaft. *B*, Radiator. *C*, Carburetor. *c' c'* Chain pinions. *F F*, Wheel brakes. *G*, Cold air tube. *I*, Pedal of the brake T. *J*, Clutch release. *K*, Grease cup. *L*, Oil cnp of the change speed gear. *M*, Oil cup of the motor. *N*, Oil cup. *O*, Lever of wheel brake. *o o*, Levers of the brake bands. *P*, Controlling lever. *p*, Pump. *p'*, By-pass. *Q*, Muffler. *R*, Water tank. *r'*, Plug. *R*, (Right figure) Gear case. *S*, Fly wheel. *s*, Bolt of the disengaging lever. *T*, Brake on countershaft. *t t*, Chain tension rods. *U*, Burner case. *V V*, Connecting rod of steering wheels. *v v*, Buffers of the steering wheels. *X*, Gear case. *x*, Drip cock. *Y*, Hood covering lower face of motor.

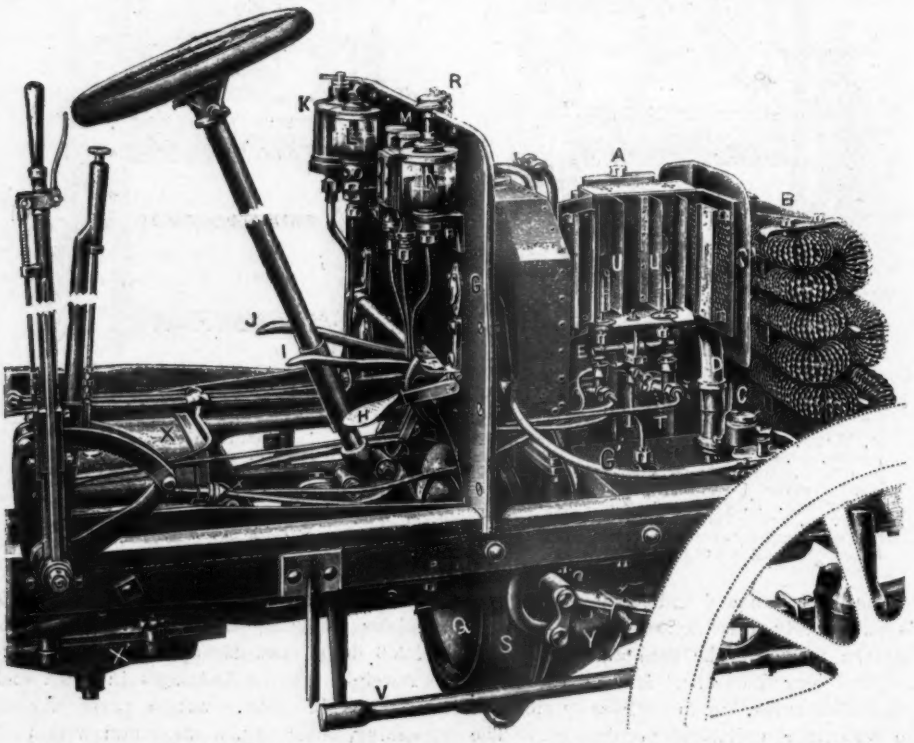
The light Panhard and Levassor carriage is not merely a reduction of the classical pattern made by the firm and which has inspired our industry. It has the same general features, but is sufficiently modified to constitute a distinct personality. The necessity of making it light has compelled the constructors to make it simple. This consideration leads me to say how wise has been the recent decision of the sports committee of the Automobile Club of France not to allow in the races of 1902 racing vehicles weighing more than 1,000 kilos (2,200 lbs.). Let us hope that their highest weight will be 900 kilos in 1903, and 800 kilos in 1904, with a possibility of reaching, some day, a maximum weight of 500 kilos (1,100 lbs.).

The light Panhard weighs, when loaded and ready, about 650 kilos (1,430 lbs.), and the heavy one 1,200 kilos (2,640 lbs.). It is of two models: with a motor called

5-horsepower, which has 7, and with a motor called 7-horsepower, which has 9½. The frame of the former is worth 6,400 francs ($1,280), and of the latter 8,900 francs ($1,780). The speed on the level is 38 kilometers (23 miles) per hour for the former and 50 kilometers (35 miles) for the latter, carrying four persons.

The parts are often identical; the front tires are 750 millimeters in diameter and 65 mm. of section; the rear ones 870 mm. and 90 mm. The dimensions of the frame are the same in each case, 80 centimeters in width and 1 m. 77 in length. The controlling levers, steering and braking parts, pump, chains, etc., are necessarily interchangeable from one model to the other. But the parts of the principal mechanism, although designed on an identical plan, are not similar, since they have to stand different efforts. A 7-horsepower motor, for instance, could not be substituted to one of 5-horsepower. The most characteristic feature of the light Panhard is the mechanism of the speed changes, which is mounted on the frame in an entirely novel way. It does not admit of a fourth speed, but, by means of one lever instead of two, gives three speeds forward and one backward.

The two plan-cuts, obtained by photographing both faces of the frame while vertically lifted by a crane, allow us to follow all the details of the parts. The frame is presented without the body, the mud guards, oil tank and the burners being attached to the body. The motor is seen in A. It is composed of two balanced cylinders, which inhale gas from a carburetor, C, similar to that already known. The hot air admission is regulated by the wicket, D, and the cold by the button, C, on the cap of the carburetor. The driver can control it without moving by closing more or less completely the orifice, G, on the splash-board of the carriage. The firing is done by incandescent tubes, for which elec-



MOTOR AND GOVERNING PARTS OF THE LIGHT PANHARD & LEVASSOR CARRIAGES.

a, Strap tightening escapement plugs. *b*, Radiator. *c*, Carbureter. *d*, Intake tube. *e*, Tubing in T of burner. *g g*, Cold air intake. *h*, Accelerator pedal. *j*, Disengaging pedal. *l*, Oil cup of change speed gear. *m*, Oil cup of motor. *q*, Gearing cone. *r*, Plug of water reservoir. *s*, Fly-wheel. *t*, Needle valve of the burners. *u*, Burners. *v*, Steering rod. *x*, Gear case. *y*, Hood under motor.

tricity can be substituted or added for security.

The exhaust is done by means of two pipes instead of one as heretofore. Each cylinder disgorges separately and its action cannot be disturbed by that of the other. The working of the motor is consequently surer. The cooling is done by 20 liters (about 18 quarts) of water, circulated by a centrifugal pump, driven by friction on the fly-wheel of the motor through the radiator, B, shaped as a wind-cutter. Thus fed, lighted and cooled, the motor normally turns at 700 revolutions per minute. The same pedal, H, similar to that of the heavy vehicles, can accelerate it to 1,000 or 1,200 revolutions, or slacken it to 300 (about), by acting on the governor.

The fly-wheel, S, of the motor is, on its outward face, cone-hollowed, as customarily. Into this cavity, the sides of which always are slightly corrugated, penetrates an aluminum cone, Q, faced with leather and strongly pressed by a coiled spring, R. This cone adheres, first slightly, then solidly, to the fly-wheel of the motor. Its gradual adherence produces the movement of the carriage, since it is mounted on the central transmission shaft, and governs, by means of gears, the chains of the vehicle, which starts without sudden jerks. The driver has only to press the pedal, J, in order to master the effort of the spring; that is to say, to draw backward the shaft, *a*, and the cone, and disengage in that manner.

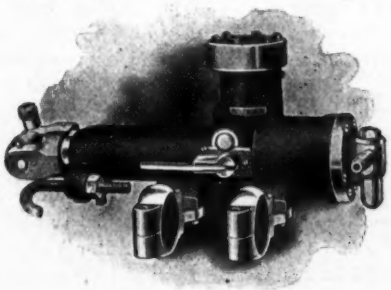
The shape of the gear-case differs chiefly from that of the usual Panhard case. There are no supporting rods on the reaches of the frame. Moreover, it conceals the two gear wheels, which, as will be explained, cause the backward motion. It is already understood that the differential-axle now bears only one beveled-wheel, instead of two, which is constantly in mesh with the transmission bevel-wheel. It is not displaced laterally as in the larger models to stop or move forward or backward. The central lever no longer exists. The stopping position is shown on the quadrant of the speed lever and corresponds with the disengearing of the upper and lower gears.

There are two brakes. The pedal (I) tightens metallic jaws on the drum, T, of the differential-axle and holds both ways. The lever, O, acts on a transverse rod, crossing the frame; on the ends of this rod are levers acting on the brake bands, FF. The steering is done by a hand-wheel operating an encased worm gear and the coupling rods, which are well known.

(TO BE CONTINUED.)

Reason Automatic Air Pump

The Reason Automatic Air Pump Co., of Pontiac, Mich., presents a convenient automatic air pump for steam vehicles. The manual labor incident to keeping up pressure in the gasoline tank is one of the most disagreeable features of the steam vehicle and one sure to be disposed of sooner or later. There are certain objectionable features to both cross-head and steam-driven pumps not necessarily met in this device and it has no apparent troubles of its own. The new pump is attached to the rear axle of the vehicle and by a simple device accurately adjusted and firmly secured to the yoke around the differential gear and is operated by a cam disk bolted to the differential gear. It can be set by a simple adjustment to automatically lock and unlock



at any predetermined pressure from 5 to 80 pounds. The variation between the locking and unlocking points can be regulated at from 5 to 20 pounds, thus maintaining a reliable uniform pressure between the two points of adjustment. The capacity of the pump is from 49 to 50 pounds of air pressure in from three to five minutes. An auxiliary device is provided whereby the pump may be started and stopped from the seat if desired. The pump weighs about 7 pounds, is neat and compact and occupies but a small space on the vehicle.

PLANS FOR A NATIONAL ASSOCIATION

There can no longer be any doubt that the plan of affiliation proposed by the Automobile Club of America will not find general favor, although it will doubtless be accepted by a few clubs, some without thought or knowledge of the circumstances involved and some because of the already close affiliation of their members with the gentlemen, or some of them, who compose the New York club. It may be taken for granted, therefore, that, sooner or later, there will be formed an association of national scope in which all the governed will have a voice, and it need not be feared that the gentlemen in New York, when the matter has been properly presented to them, will withhold their support from such an association, whose advantages will be patent to every one.

* * *

The time of the formation of such an association should not be long delayed. There will come, with the new season, the need of the assistance of numbers in many directions, as for example racing, road improvement and legislation. Of the three matters named that of road improvement is the most pressing. We may manage to scramble along with faulty racing rules, allowing time to show us the shortcomings and teach us how to overcome them. If the racing rules are faulty—and they are—no one will suffer but the people to whom the sport is the all-in-all of automobilism and while a great number, possibly, even, a majority, are interested in the doings of the speedy machines, racing is, after all, a secondary consideration. We might get along without racing. We cannot get along, to advantage, without decent roads to go on. Hence the matter of road improvement is head and shoulders above all other subjects in importance.

* * *

Every day lost in the formation of an association of national scope is a day lost to some of us in the enjoyment of those rights and privileges to which we are entitled. Every week we lose in the commencement of the work delays the final result just that long. All hands should therefore be up and doing, lending a willing hand to the great work which is to automobilists, horsemen, cyclists, business men of every class and to the nation, one of the most important subjects with which we have to deal. It is not to discuss the condition of the roads, however, that this article is offered. It is, rather, to show the urgent necessity of a national association, and to consider the lines on which it should be formed, so that their condition may be improved.

* * *

Taking it for granted, then, that the improvement of roads should be the first aim of automobilists, how shall we go to work to so organize as to attain the best results? We have before us, as an excellent example, the work of the Automobile Club of America. That organization has done more for the cause of good roads in the short period of its existence than was ever done by any other institution in the same space of time. The reasons are obvious. The members of the club are, in large part, men of wealth and influence. They realize that great goo will accrue, not only to the automobilist but to all classes, by the establishment of passable highways. They have learned by experience that the prosperity of the country, of the farmer, of the railroads, of every one, is dependent largely on the facilities provided to get goods to market. They have not been actuated, therefore, by the one selfish idea of good roads over which to make fast time in their machines. And if they had their efforts would be just as beneficial to other users of the highways.

* * *

Any movement which has been successful in one part of the country might be well tried in another, or all others. If the assistance and advice of the originators of the movement can be obtained, so much the better. It is submitted, therefore, that the members of the Automobile Club of America should be consulted, and their advice accepted, in the formation of such an association as has been proposed. Their work in the past entitles them to all the consideration possible. So far as they are concerned

they are entitled to first consideration. So far as the country at large is concerned it needs, and will doubtless be glad to accept, the assistance and guidance which the gentlemen of New York can render. At no distant date, unless signs fail, there will be a meeting of club men and automobilists generally. That meeting should be called by the Automobile Club of America.

* * *

But on the other hand, New York is by no means the United States. In Illinois, for example, where the lack of good roads costs the farmers something like $100,000,000 a year, we need proper representation in the association and on its road committees. We need as much encouragement as can be rendered in the matter of racing, for although subservient to the great object of road improvement racing is of vast importance, if for no other reason because of the publicity it gives the sport and the consequent impetus it gives the industry. In the west we need careful attention to the acts of the legislators, both state and municipal, even more attention, indeed, than does the east where greater experience prevents those foolish outbreaks which sometimes characterize the actions of hayseed legislators. Therefore the west needs the association and needs it badly. It will probably find men willing to accept their share of the burdens necessary to the work in hand.

* * *

The meeting, it is submitted, should be held at the time of the Chicago show. It should be earlier, if such a thing were possible, but it is doubtful whether it would be possible to secure, before that time, an attendance which could be so representative of the whole country as to claim to be national in character. The show, in itself, will be an attraction which will draw people from all parts of the United States. They will be men of the class which is most likely to furnish the material for the work which will have to be undertaken—enthusiasts, both of the sport and trade, whose interests and inclinations are in line with the work before the association.

* * *

The membership of the association and the manner in which it may be represented in the deliberations are matters which should receive the most careful consideration. Every man who owns an automobile is worthy of consideration. Every man, whether he owns an automobile or not, whose interest lies in the direction of the improvement of roads, is worthy of consideration. That means every man in the country, though less than 50 per cent of them realize the fact up to date. There are many road improvement associations which should receive consideration, the most prominent among which, and the one which has done most of the real good, is the National Good Roads Association, which has headquarters in Chicago. These should be given representation at the meeting if the association is to make the best use of its opportunities. The League of American Wheelmen might be considered. With its hundreds of motor cyclists, all automobilists in a sense although not recognized as such by the new racing rules of the A. C. A., it will be an important factor. And there are men in the league who can give some of the best information obtainable on the subject of roads, for they have made a study of the matter for 20 years.

* * *

A word, by the way, relative to the cyclists. There is a disposition among certain automobilists to regard them as an inferior class. That is a mistake. Some of the foremost men of the country may be found on the list of members of the League of American Wheelmen. Many of the men in the front rank of the automobile industry and trade were cycle makers and cyclists. Some of the money which keeps our automobile factories running was made in the cycle trade—now a shadow of its former self, if you please, but none the less the forerunner of many of the facilities and improvements which are enjoyed by automobilists today. The cyclist can and will render valuable assistance in any work the association may undertake. The plan of organization of the League of American Wheelmen furnishes many good ideas. It has developed as a result of an experience of 25 years. There are men associated with it, as members of committees and officers, who have been through the whole proceedings and who can tell of many good points to be followed to advantage in a new body.

* * *

How shall the new association be governed? The plan of state representation is

one which has worked well enough for the United States government for a great many years. It has worked well in many other organizations, with members all over the country. It might be made to work well in the new field. State elections of officers, by mail or at annual meetings, would furnish the material for the national body whose president and other officers and committees might be elected by these state delegates. The necessary committees might be elected by the delegates, appointed by the president, or even selected by a popular vote. The first named plan would probably work well, or at least the chairman might be elected by the delegates and allowed to select his own associates, subject to certain restrictions relative to geographical locations. Every committee should be national in constitution and of sufficient size to give each section proper representation.

* * *

It is not the purpose of this article to enter into every detail of the plans of an association. They can only be worked out after a free and full discussion of the conditions at a general meeting. There is just one other matter, however, on which it may be well to touch—the membership fee. It should be nominal. It should be smaller for a club member than for an unattached person. The force of numbers counts with every one, and notably with the legislator. An association with a membership of 100,000, which is by no means impossible, can do more good with a nominal fee than can an exclusive affair with a large fee. Money is a necessity, of course, but better obtain it from a great many than from a few. Clubs might be taken in as a whole, and might be permitted to cast their vote as a whole. The encouragement of clubs should be one of the objects of the association, for in constant communication between members there is aroused that enthusiasm which is essential to the well being of the cause.

The Fisher Automobile Station

The illustration represents the station of the Fisher Automobile Co., which considers it the largest and most complete in America. The company has leased, for a term of five years, the old Cyclorama building, within one square of the center of Indianapolis. It has 15,000 feet of floor space in the main salesroom, the dome of which is 65 feet from the floor, with a skylight 20 feet wide running entirely around the roof. The company has, aside from the main storage and salesroom, a shop 150x40 feet, its own charging plant for electric vehicles, independent lockers and rheostats for customers, a gasoline reservoir 10 feet underground, ladies' reception room and a library treating of electrical mechanics, steam and gas engine construction, operation of automobiles, etc. The company has a perfectly organized force of employes and mechanics and, with all rigs in the house, has, it believes, the largest collection of automobiles to be found in the west. After Jan. 1, the Fisher company will open a ladies' class of 100, teaching the complete operation of the electric vehicle at a fee of $5. It will issue, to each competent pupil, a diploma which will entitle her to rent electric vehicles. A part of the office room has been set apart for the Automobile Club of Indiana or visiting automobilists, where complete files of automobile papers and magazines are to be found, together with road maps and general touring information.

THE FISHER AUTOMOBILE STATION.

GREAT BRITAIN'S HEAVY MOTOR WAGONS

NUMBER TWO.

GEO. F. MILNE & CO.'S WAGON, WINNER OF GOLD MEDAL IN CLASS A.

The only wagon driven by an internal combustion engine, entered in the Liverpool trials, was the Milnes lorry. Two of these vehicles were entered in class A, which classification was, load 1½ tons; maximum weight, 2 tons; minimum level platform area, 45 sq. ft.; minimum width of driving tires, 3 inches; speed, 8 miles per hour.

The two vehicles were practically identical and the principal dimensions were: Total length, 16 ft. 11 in.; width, 6 ft. 4 in.; weight, 4,424 pounds; maximum load, 3 tons; platform area, 10 ft. 2 in. x 5 ft. 8 in.; diameter of driving wheels, 3 ft. 4 in.; diameter of steering wheels, 2 ft. 8 in.; gauge, 5 ft. 2 in. at centers.

The frame is constructed of channel steel, which is supported upon the front and rear axles by four semi-elliptical springs. The wheels are of the artillery type, and are shod with iron tires. A two-cylinder motor of the Cannstatt Daimler type is fixed to the frame beneath a bonnet in front. The cylinders have a bore of 4¾ in. and the stroke is 5⅛ in. The motor develops 10 B. H. P. at a normal speed of 750 revs. per min. It has a cam shaft on each side of the crank chamber, that on the one side carrying the governer-controlled exhaust cams, and that on the other side carrying cams which operate the igniters. Simms-Bosch electric ignition is employed on the low tension "make and break" system.

A float feed carburetor is used, and is fed from a large tank placed across the back of the frame, under pressure. A gear driven rotary pump circulates the cooling water from the cylinder jackets through a tubular cooler. The cooler is of the marine condenser type, and is placed immediately in front of a fan on the end of the motor shaft. Four gallons of water are carried in all.

The change-speed gear, which is enclosed in an oil tight case, and is fixed to the frame immediately behind the motor, can be thrown in or out of engagement with the crank-shaft by means of a large cone clutch, having metal to metal (cast-iron) faces. The gear provides four speeds forward, 1½, 3, 6 and 8 miles per hour, and one speed backward, 2¼ miles per hour.

The four sliding gear wheels, G1 G2 G3 G4, on the motor-driven shaft G are arranged in pairs upon two independent sleeves. The second-motion shaft H is placed immediately beneath this shaft; it carries four fixed toothed wheels, H1 H2 H3 and H4, inside the case, and it projects through the casing at both ends. The forward end carries a brake drum, K, and the other end a universal coupling, J. A separate hand-lever controls each of the sliding sleeves, the one bringing the first or

second gear into use, and the other operating either the third or fourth gear. The two levers, which are placed side by side in the center of the footboard, are so arranged that neither of them can be moved from its neutral position unless the other is in that position. The principle employed also provides for the automatic disengagement of the friction clutch whenever either gear lever is moved. A reverse speed is obtained by bringing an independently mounted pinion into common mesh with one of the gear wheels on each shaft; the lever which brings this gear into operation also puts any of the forward speeds out of gear.

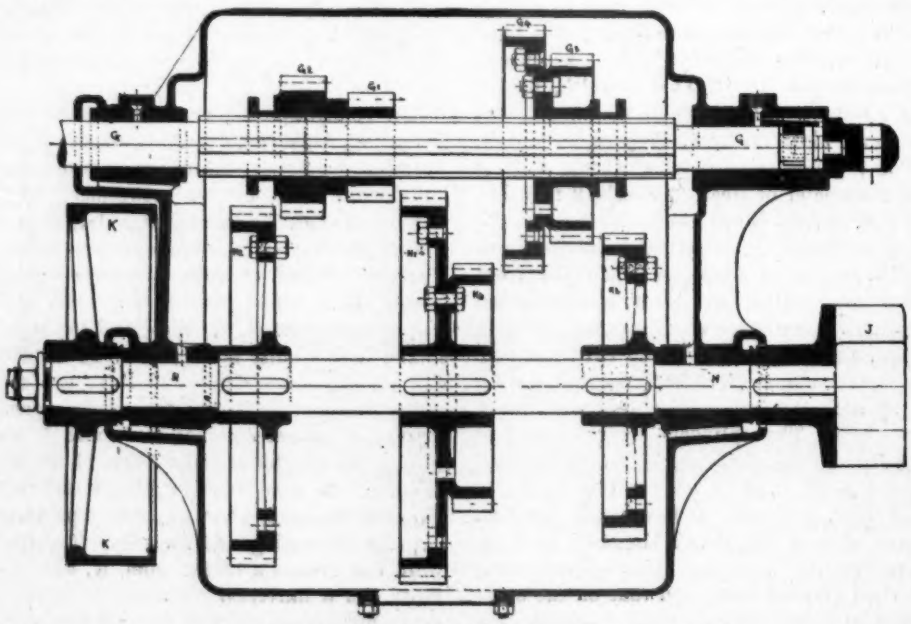
A brake having two blocks H, of the locomotive type, acts upon the brake-drum, K, on the forward end of the second-motion shaft; the blocks are fixed to levers, M, pivoted at fixed points, M1, and inter-connected by the rod, N, and the crank-lever, N1. The rod, N2, actuates the brake when it is raised.

The power is transmitted from the change-gear to a combined differential and bevel gearing by a longitudinal shaft, having a flexible coupling at each end. These couplings are formed of balls with cotters passing through slots. The remainder of the transmission mechanism is carried upon the rear axle and upon two metal cased wooden ties, which are hinged at their forward ends to brackets on either side of the frame. The brackets project downward.

The driving wheels are dished, and are fitted with internal toothed wheels. For this reason the two halves of the transverse countershaft, B and C, which carry pinions, D, gearing in the large internal wheels, are not in line with each other, but slope downward, outwardly from the center of the vehicle.

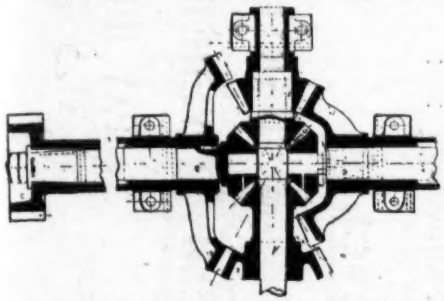
The countershaft is carried in bearings, and it lies at right angles to a short shaft, A, which is driven by the universally jointed longitudinal shaft passing from the change-speed gear. Owing to this arrangement it was necessary to devise a special form of differential of bevel gear for transmitting the power to the road wheels. This device is shown in section in the drawing, where it will be noticed that eight wheels in all are used—four forming the differential and two pairs, E, E1, and F, F1, constituting the bevel drive; the wheels are shrunk on to their respective shafts, and it will also be seen that the short longitudinal shaft, A, is carried in bearings on each side of the casing which contains this combined mechanism.

The steering gear is of hand wheel and



THE MILNE CHANGE-SPEED GEAR.

worm form. It gives an angle of lock of about 40 deg. Other controlling devices consist of a pair of block brakes, which can be made to press against the iron tires of the rear wheels, and which are actuated by a hand-wheel and screw, and of what for want of a better name we must call



Milne's Secondary Shaft and Differential.

an accelerator; in reality this latter regulator is exactly the opposite of what that name implies; it is a lever (placed in front of the driver) which acts upon the centrifugal governor and which allows of the engine speed being reduced below the normal point. The petrol tank holds about 11 gallons, and is intended to carry 10 gallons, which, as will be seen from the results of the trials, is sufficient for an average run of about 100 miles with normal load. The muffler, which is extremely effective, is placed across the underside of the frame, in front of the gasoline tank.

Machinery Helping Animals

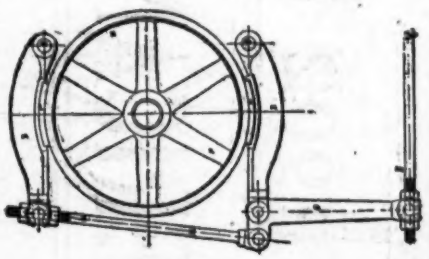
The lightening of human labor by modern inventions is so old and familiar a story that it needs no retelling, but there is more novelty in some noteworthy gains made in relieving horses and other beasts of burden from some of their most severe and painful tasks. Progress in that line is extremely welcome to persons who have kindly consideration for our four-footed servants.

The passing of the street car horse has been noted and commented upon, it is true, almost as much as an incident in the development of better conditions for the lower animals as it has been discussed from the economic point of view. The lessening of suffering was too manifest to escape the most callous, when cars crowded with passengers eager to get home were whirled up hills and around slippery corners, on wet tracks, by the invisible power of electricity instead of by straining horses, overtaxing their strength under the lash of drivers who simply had to make time, at no matter what cost of hardship for the animals they guided and urged on.

Now experiments with motor trucks in New York and other great cities indicate that the automobile may assume its most kindly form in doing away with the use of horses for drawing heavy freight vehicles. If that shall prove to be so there will be far fewer painfully burdened horses in the world, and much of the hardest work now done by animals will be performed by machinery. When roads become good enough, and motor vehicles attain a sufficient stage of development, it may happen that farmers will send most of their heavy products to market in motor vehicles. That would mean much additional relief for horses.

So the progress of invention and science will surely make life easier and pleasanter for the lower animals as well as for man. That is one of the natural and certain phases of the world's gains in knowledge, civilization, and in kindliness of feeling toward our humble neighbors, the creatures that serve, amuse, and please us, but are unable to speak their wishes or plead their cause in words.

Only in war there is no hint of progress in the same direction. It still involves



The Milne Brake.

wholesale misery and agonizing death for multitudes of horses and other domestic animals. And that is one more proof that General Sherman knew what he was talking about when he said that "war is hell."
—Cleveland Leader.

1902 ANNOUNCEMENT

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THE FRENCH AUTOMOBILE SHOW

The French show opened Tuesday. The New York Herald's Paris edition contained the following interesting details:

The Champs Elysées this evening were ablaze with lights and re-echoed with the noises of hundreds of automobiles pouring up toward the Grand Palais, where the automobile show is being held.

The automobile show of 1901 will count in th annals of automobilism as one of the most interesting and imposing demonstrations of this industry. It marches on from one achievement to another and, after the conquest of the roads, is perhaps going to give us the conquest of the air.

The latter reflection is forced upon everybody who crosses the threshold of the Grand Palais. The first thing which strikes the eye is M. Tatin's dirigible balloon, a gigantic cigar floating in the grand hall.

A little later on I had the opportunity of admiring a motor in the Mors exhibit. Thanks to this motor, M. Tatin hopes to beat M. Santos-Dumont's record by fifteen minutes.

BEFORE THE STANDS.

But for the present let us remain on the earth, since we must, yet awhile, and devote our attention to the interesting round of stands.

Before describing the stands, which, from a rapid visit, I should not have time to do, I must point out two general characteristics of this exhibition from the point of view of mechanics. Nearly all the builders have lightened their frames. These frames, while appearing to possess more than reassuring powers of resistance, are lighter and more nervous.

One feels they have got rid of all "superfluous fat." They are good, simple, graceful frames, having that mechanical grace which consists in the absence of every useless element. They are placed lower and nearer the ground.

The tendency is now in the direction of wheels of equal size. The majority of exhibit one or more "naked" frames. This is an excellent custom, profitable to both seller and buyer, and also to the interested amateur who likes to divest the motor of all its luxurious livery, for—and this is the second point to which I wish to call attention—the automobile exhibition is more than ever combined with an exhibition of carriage building.

Here also taste appears to be moving in a definite direction. It is all for comfort. It has at length been understood that touring requires not speed alone, but good cushions and good backs to lean against and shelters from rain and wind.

The result is that a remarkable effort has been made by the carriage builders of Paris to create models devoted to these ideas

The transformation is complete. The "tonneau" still exists, but it is double the height and carries a screen. The double phaeton, which is so convenient for road work, appears more and more frequently. Lastly, closed carriages, "limousines," omnibuses and "Berlines" take up definitelv that position which is due to spacious and convenient traveling and family conveyance.

Voiturettes are numerous—more than numerous. With them there is less comfort, but the price is so seductive that buyers are many and competition is keen.

Unfortunately I have always feared, and do still, that, apart from two or three classic makes, the tendency toward cheapness induces the manufacturers of these articles to deliver goods of inferior quality and, hence, inferior solidity. This would be a danger for automobilism.

TWO GREAT COMPETITORS.

"A tous seigneurs, tous honneurs!" Here are two great competitors in the international cup and Paris-Berlin race, eternal rivals, whose productive struggle continually engenders fresh progress. I have named Panhard and Mors.

The two stands, both of which give a striking idea of the strength of the firms which represent trophies, face one another. On the one hand is the international cup, won by M. Giradot. On the other are three prizes from the German Emperor, the King of the Belgians and the Grand Duke of Luxembourg, won by Mr. Founier.

The Société Panhard-Levassor exhibits its centaur motor without movable "culasses,"

with the centaur carburator, admission regulator, ignition by dynamos and accumulators, a new distributor of electric lighting, a speed box suspended from the frame by "cadres à rotules," and a new pump, "a grand debit."

The models exhibited are a cab, a 5-horsepower vehicle for doctors and business men; a 10-horsepower "tonneau," with a movable "arriere;" 16-horsepower automobile, with "very luxurious tonneau;" a carriage like that of the King of the Belgians, a 12-horsepower landau, with a moteur noyé under the driver's seat, and a light frame 15-horsepower.

In the rival stand the Société Mors exhibits new types for 1902. The motors are of the type called "Paris-Berlin."

They are of 8, 12 and 15 horsepower, four cylinders, complete water circulation, water jacket in aluminum, admission and escape regulated, ignition by magneto, tournante, four rates of speed, hand backward movement with levers at the side, and, in the case of the 15 horsepower, backward movement and change of speed by single lever, four equal sized wheels, very light frames, weighing 500 kilogrammes for 8 horsepower; 750 kilogrammes for 12 and 800 kilogrammes for 15 horsepower.

There are also some graceful types of carriage building in tonneaux, double phatetons and limousines.

The stand that next attracts attention is that of the firm of Gobron Brillie, which has a specialty of alcohol motors. Motor, carburetor and "magneto" are exhibited on a demonstrating frame, thus enabling one to see the great simplicity of arrangement and organs. Luxurious carriage work mounted with other frames shows that this firm also understands real touring requirements.

Touring automobiles are also exhibited by Bollée, a horizontal petroleum motor, two cylinders of 11 and 12 horsepower, with special regulator, having extension gear, constant compression, a powerful frame, screwless, irreversible steering gear and control over the driving wheels by means of chains.

M. Léon Bollée, king of automobile mechanicians, still devotes himself to small carriages. He exhibits a "tonneau," doctor's cab and naked frame.

Another "simplifier" is M. Charron. His firm exhibits a frame, the Charron, Girardot & Voigt frame, very light and very graceful, with four-cylinder motor, 16 horsepower, easy working valves, ten seconds "demontage," ignition by magneto, with reserve accumulator, new water circulation, escape regulator, admission regulator, friction clutch without strain on motor, easily regulated spring for throwing machine out of gear, four changes of speed, and backward movement with same lever; new brake, new mounting of frame, with all pieces interchangeable.

The same firm exhibits some electric carriages manufactured in America after its models. These vehicles are light and graceful. Their battery enables them to cover a distance of 80 kilometers.

The Serpollet carriages show fresh improvements. The condenser is lighter and less cumbersome. With sixty litres of water the 6 horsepower motor easily covers 150 kilometres. Finally an ingenious and simple arrangement suppresses the use of a hand pump and enables the boiler, the characteristic of which is to be without volume, to possess a reservoir comparable to that of ordinary boilers, while the reserve is removed from the action of fire and can be maintained even when the boiler is not heated.

A TOURING CARRIAGE.

Pretty also is a light Georges Richard carriage, 1902 type, which has been studied under its various forms with a view to touring. It weighs about 500 kilos and consumes little, as was proved at the last "concours de consommation."

At M. Clément's stand there is a beautiful exhibition of all kinds of voiturettes, extra light models for town work and stronger models for road work. This exhibit is combined with an exhibit of carriage building. Each frame carries a carriage made by the new firm of Clément & Rothschild, a happy combination destined to manufacture wholesale for builders those models which the Rothschild firm manufactures for its customers.

Automobiles for Military Use.

Last year the emperor of Germany offered a prize of $20,000 for the best automobile for military use which could be produced, and the manufacturers of motor vehicles bent all their inventive and mechanical energies toward securing the re-

ward. Now the British war office has offered, among other inducements, a prize of $8,000 for a motor car for military service which shall possess certain specified qualities.

The terms of this British competition prescribe explicitly that the machine must be capable not merely of carrying a few persons at great speed over smooth highways, but also of drawing heavy loads at a moderate rate of speed over ordinary country roads. The prize named will be awarded for a motor which shall weigh not more than 13 tons and shall be able to draw a burden of 25 tons on a maximum grade of one in eighteen. It must maintain a speed of from 3 to 5 miles per hour and travel 40 miles without stopping for supplies. If, under these conditions, the machine is able to go more than 40 miles, a bonus of $50 will be allowed for each mile it can travel beyond that distance.

Other provisions of the offer are that the machine shall be able to proceed at the rate of 8 miles per hour for a single mile, and shall be adapted to travel through water not more than 2 feet deep. In judging of the respective merits of the different machines submitted their drawing power will be regarded of first importance, while cost, noisiness, simplicity of construction and operation, and the expense of the fuel required will also be considered. Any sort of motive power will be acceptable, if it assures the result sought. The machines to be used will carry a winding gear and 75 feet of steel rope, for use in drawing up hill large guns which could not readily be moved by ordinary means.

During the past 3 years the possibilities of automobiles for use in the army have been discussed to a greater or less extent by nearly all the great nations of the world, and experiments have been conducted in the effort to determine in what particular capacity motor vehicles were likely to be of the greatest military utility. That such vehicles on the field are superior, in numerous respects, to horse-drawn wagons has been demonstrated beyond doubt; and that, sooner or later, they will occupy a fixed and prominent place in the armies of the world seems certain.

As to what place in the army the automobile is best suited to fill expert military opinion changes frequently. During the French manœuvres in 1898 the automobile was valued chiefly for its great speed, which enabled a commanding officer personally to inspect his troops in a surprisingly short time, and also facilitated greatly the delivery of important communications. In the year following, when the automobile's carrying powers were increased, its greatest advantage seemed to lie in its capacity to transport provisions from one point to another. Then it was found that the machine could be employed profitably to transport artillery and ammunition; while now, if we may judge by the mammoth size and vast power of the motor cars desired for use in the British army, the serviceability of such machines, in a military sense, appears to be virtually unlimited. They will be made to transport not only armies' equipment, but also the armies themselves, together with whatever else it may seem desirable to take along.

The present movement on the part of the British war office has resulted, undoubtedly, from the experiments with motor vehicles which have been going on in South Africa. There it has been shown conclusively that these possess advantages which entitle them to rank highly among the agents of war. But the tests conducted in that region were more valuable, perhaps, for proving in what particulars the automobiles used were deficient, rather than in those where they excelled their horse-drawn predecessors. The chief requisite of self-propelled vehicles for military use appears to be great drawing power—power sufficient not only to move exceedingly heavy loads under favorable conditions, but also sufficient to draw such burdens over rough roads and through countries which defy all other means of travel.

Only a short time ago Gen. Miles manifested keen interest in the automobile as a prospective auxiliary in the United States army, and expressed the belief that the machine would be extremely useful in certain branches of the service; and as time goes on and the defects now apparent in such machines become fewer, interest in them is bound to increase in this country no less than in Europe. This being the case, experiments which tend to reveal the true worth of the automobile in its various capacities will be valuable.—New York Sun.

GREAT SHOWS IN GREAT BRITAIN

London is annually the scene of two great cycle shows. Of late years they have been automobile shows as well. The Stanley Club commenced these shows 25 years ago in a very small way. The first was held in a tent on the Thames Embankment in the days when the makers could be counted on the fingers. In later years the manufacturers' association came into the field and attempted to run things, but the older institution had been too long in the field and has managed to hold the more important show to this day.

When the makers commenced holding shows they were usually held about two weeks before the Stanley. Perhaps to make things more interesting for their rivals and perhaps to secure the attendance of the dealers, who were always in evidence at the Stanley, they changed their tactics 3 years ago and held the show at the same time as the older fixture and to that policy they have adhered since. That accounts for the fact that two big shows were in town at the same time during the 8 days commencing Nov. 22. The Stanley held forth at Agricultural Hall as usual and the makers' association at the Crystal Palace.

Few English Automobiles

The automobile feature was not as strong this year as last. Another entanglement arose in the form of an association of automobile makers who passed a resolution not to exhibit at any but the automobile club's show and to shut out of that event any maker who dared show elsewhere. The Stanley was, therefore, almost devoid of automobiles, while the number at the National—the name of the makers' show—was greatly reduced.

A notable feature of each exhibition was the abundant exhibit of motor cycles, and it is gratifying to note that the American machines of this type were among the most favorably received. The Stanley show, the twenty-fifth, was particularly successful, and was representative of the better element of the cycle trade. There was a strong representation of high-class manufacturers of complete machines, a large array of cycles built from parts, and a comprehensive collection of parts and accessories, both by makers and jobbers, the latter being in great force. Motor bicycles, both complete and in parts, fittings and accessories were in surprising force, over forty exhibitors showing complete machines and a number of others showing motors and accessories.

French Carriages Displayed

At the National the visitors' attention was divided between the exhibits and an acrobatic performance which took place twice a day. Considerable trouble was caused on this account early in the week, as the visitors would climb all over the exhibits in their endeavor to see the vaudeville attachment to the show. The exhibits were, of course, similar to those at the Stanley, though more space was devoted to automobiles. Several new English carriages of much promise made their first appearance and several well-known French manufacturers presented their 1902 models for the first time, in some cases before they had been seen in France, as the French show did not open until this week.

While a number of motor bicycles on exhibition at the shows have been described in this paper, and many were almost identical in design, being merely examples of methods employed by different manufacturers in assembling the Minerva motor and accessories, there were a number of machines new to American readers. Prominent among the new ones were two women's models with drop frames. The Excelsior, manufactured by Bayliss & Thomas, has the engine and transmission apparatus covered by removable guards. The motor is carried below the bottom front tube in front of the bottom bracket and the carbureter is located back of the head between the upper and lower frame tubes. The motor is 1¼ horsepower and the drive is by the usual twisted leather belt to the rear wheel.

The Albone has the motor similarly located, but the frame lines are of more pleasing appearance and the machine looks lighter. The lower frame tube is straight, as is the upper from the head to a lug which

connects it with the lower tube. From this point it runs directly to the seat mast. The gasoline tank is between the seat mast and the rear stays, and a small supply pipe leads thence to the carbureter, which is set close to the head of the motor. A mud guard covers the rear wheel and the battery and coil are secured to the rear stays directly above it. A guard covers the belt from the rear stay to the motor, and would be greatly improved if it were extended to cover the motor pulley. The power of the motor is not given, but the motor being of the Minerva type, it is probably of the usual 1¾ indicated horsepower.

The Flying Chapelle

Of the foreign-made motocycles probably none attracted more attention than the Chapelle, the French machine with which Cissac recently defeated all comers at Paris. Its distinguishing features are a two speed gear, which also allows the motor to run free, and a double front fork. The motor is 1½ horsepower, and from the performance of the machine on the track and road must be well able to give all the power claimed for it. The carbureter is of the automatic constant level type. The operating levers are all on the top tube near the front of the frame.

A Machine Beyond Description

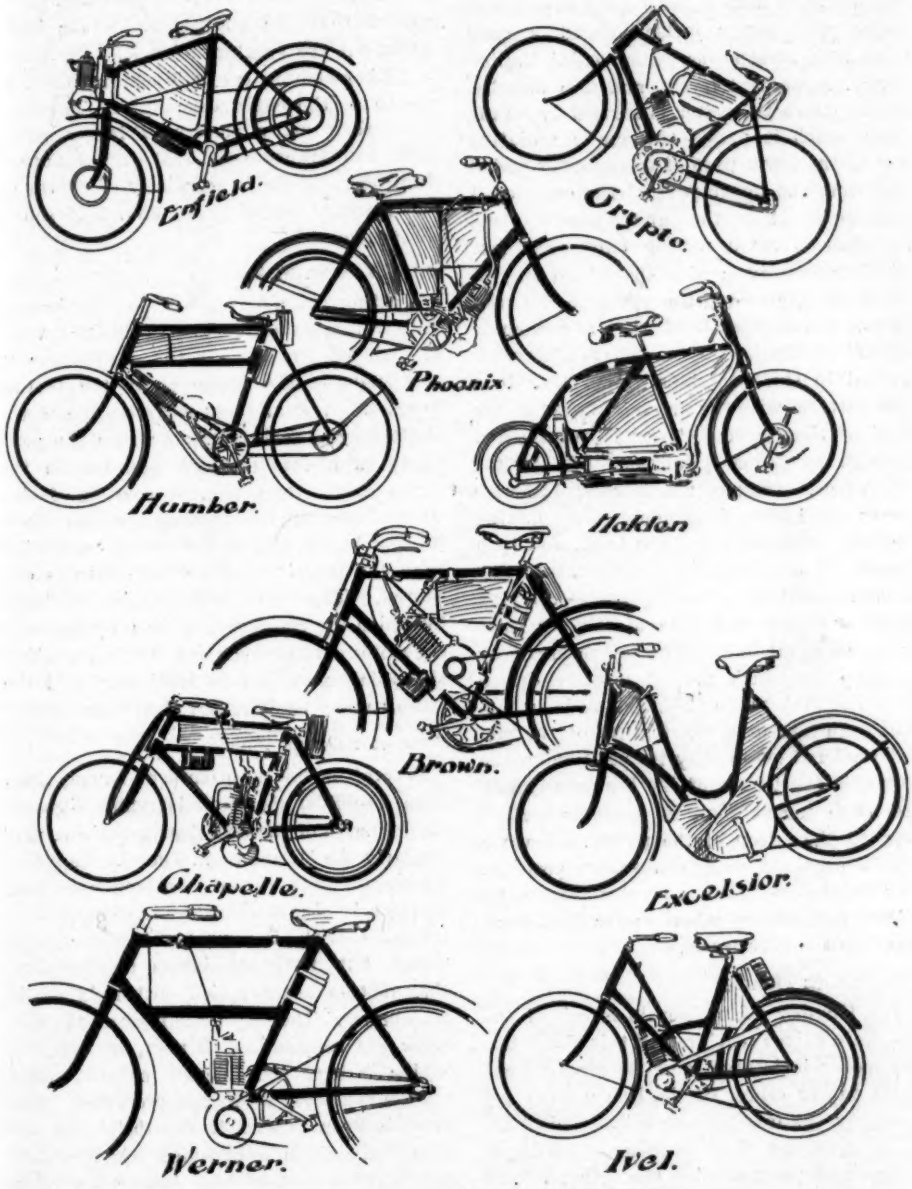
The most radical departure from accepted lines was the Holden, manufactured by the Motor Traction Co. At the present unsettled state of the motor bicycle design it is perhaps unfair to call anything a freak, as that which appears outlandish today may be the popular type tomorrow, but the inventor of the Holden has certainly bolted the track so far as present ideas are concerned. The general appearance beggars description, and the reader is simply invited to see the illustration. The machine has no principal characteristic. It is characteristic all over, from the bantam rear wheel to the front wheel pedal drive. The engine has four cylinders, is water cooled, and drives direct to crank on the 16-inch rear wheel, which is fitted with a 3½-inch tire. Of the three tanks the first is the gasoline, the center the water and the rear the lubricating oil, of which, judging from the size of the tank, there should certainly be enough. The front wheel is 24 inches in diameter and is provided with a Crypto gear. It is claimed by the manufacturers that this machine can be run 200 miles on a single charge of supplies.

A Peripatetic Junk Shop

Another machine, that has much the appearance of a peripatetic junk shop, is the Phœnix. It is, however, only just to state that the machine is probably better than it looks, as it has many features not found on the majority of English machines, and the undeniably cumbersome appearance is due to the great capacity of the gasoline and oil tanks. In addition to the usual gasoline tank another is located behind the seat mast, completely filling the space between it and the wheel. When it is desired to transfer the contents of this tank to the forward one, from which connection is made with the carbureter, air is pumped into the tank through an opening in the top and the gasoline is thus forced through a pipe leading from the bottom to the forward tank. The machine also has a continuous oil feed, regulated from the seat, which is a convenience less common to English machines than to those built in this country. A lift lever is provided for the exhaust valve and is so arranged that when the valve is lifted the spark is cut off. This lever is located on the handle bar, so the control of the machine is handily arranged. This machine is built with a drop frame for women's use, the tank capacity being, of necessity, much less. It is also built in tandem form. The tandem has practically the same equipment as above described, but has in addition a two speed gear located in the rear hub.

Werner in New Form

The Werner, one of the first and most popular of the European motocycles, appears in a new guise with the motor, which has hitherto been seated on an auxiliary fork over the front wheel, suspended in front of the bottom bracket in a novel manner. As shown in the illustration, the frame has a horizontal intermediate tube extending between the lower frame tube and the seat mast. The lower end of the frame tube is in the form of a yoke, which spans and is bolted to the crank case. Two lugs are provided on the crank case, between which is bolted a forward extension of the bottom bracket. The machine is very small, with 26-inch wheels, and is one of the lightest



MOTOCYCLES AT THE ENGLISH SHOWS.

motor bicycles in use. The drive is by a flat rawhide belt to a sheave on the rear wheel.

Enfield's Four Patterns

The Enfield Cycle Co. shows a varied line consisting of a quad with a 2¾ horsepower motor with water jacketed head, a quad with a 3½ horsepower water cooled DeDion motor, a motor tricycle, and two bicycles. In the quads the water is carried in a tank from which it passes through a radiating coil to the lower part of the cylinder jacket and from the upper part of the cylinder it returns direct to the tank. One of these machines is fitted with a two speed gear which runs solid at high speed, and may be thrown out, allowing the motor to run free. One of the bicycles is of what is commonly called the Minerva type, and has been described in these columns. The other is a new pattern, with the motor attached to the head of the frame. Power is transmitted through a crossed triangular belt to the rear wheel. The motor is rated at 1½ horsepower at 1,500 revolutions. The mixing valve is arranged below the tank, and both the quality and quantity of the mixture may be regulated by vertical screws carrying finger discs on each side of the top tube. Lubricating oil is supplied to the motor by a pump by which the oil may be drawn from the tank while the machine is in motion. An advantageous feature of the motor, rendered possible by its position on the frame, is the length of the bearings, which are much longer than in a motor located between the sweep of the pedals. A valve lift is provided in a convenient position. Two brakes are fitted, a hand applied band brake on the front wheel and a foot band brake on the rear wheel.

The Famous Humber

The Humber motor bicycle is one of the few chain driven machines of this character. The motor is located with its longitudinal center in the center of the line usually occupied by the lower frame tube. This tube is replaced by four members, arranged around and parallel with the cylinder, and which serve to hold the cylinder, crank case and cylinder head together. A small sprocket is secured to the motor shaft and is connected by chain to a double sprocket on the crank axle. The smaller member of this sprocket communicates with a large sprocket on the rear hub. Sprocket and chain for the pedal drive are located on the other side of the machine. Free wheels are fitted to both the driving systems, and if desired the motor driving gear can be thrown out of action. A hand brake is provided, so arranged that the application of the brake shuts out the sparking circuit. The motor is 1½ horsepower, but it is claimed that, by virtue of the chain drive, gives better results than many motors of larger power with belt transmission. It would appear, however, that the multiplicity of chains on the machine would be an abundant source of trouble.

By a Veteran Maker

Another chain-driven machine of pleasing appearance is the Crypto. In this the motor is clamped by lugs on the crank case in the angle of the frame above the bottom bracket. A small spur gear on the motor shaft meshes with a spur gear on the periphery of a double wheel mounted on the crank axle. On a central portion of this wheel is a flange carrying sprocket teeth on which are seated the chain connecting with the rear hub. No other chain is employed. The crank axle carries a clutch by which the machine may be propelled and the motor started when required, after which the pedals may be held stationary and the machine may be driven by the motor only.

American Design Followed

Several machines, prominent among them being the Rex, show unmistakable signs of the influence of the American machines, particularly the Mitchell and Thomas, imported during the last season. Inasmuch as this machine is almost identical in general construction with the machines above mentioned, but little description is necessary. Two motors are supplied, either 1¾ or 3½ horsepower. The cooling flanges on the cylinder are rectangular in plan, so that the engine is kept conveniently narrow, while a large radiating surface is presented. The drive is by a twisted leather belt. An exhaust valve lifter is provided, which is connected with the contact breaker so that when the exhaust is open the spark is cut out. The driven pulley is practically a part of the rear wheel, being connected to it by spokes running to the rim.

A machine very similar to the Rex is the Brown, manufactured, or rather assem-

bled, by Brown Bros., well known in this country. Its lines are, indeed, so similar that one description almost fits the two. The lever for advancing the ignition also serves, when reversed, for lifting the exhaust valve. Lubrication is effected by constant feed from a small tank secured to the top tube. A number of trailers were shown by the same firm.

American Bicycle Co.'s Line

The 1902 announcement of the American Bicycle Co. shows a decided and improved policy in handling the trade in 1902. The country has been divided into two divisions, the eastern handling the Atlantic coast states, with headquarters in New York; and the western controlling the middle west, with headquarters in Chicago, and a sub headquarter for the Pacific coast in San Francisco. These changes will considerably reduce dealers' expenses, and bring them into much closer touch with the American Bicycle Co., to their mutual advantage. The full line of advance catalogues is out, and travelers are on the road, closing with leading dealers for territory, and placing the well-known brands controlled by the company. The jobbing line this season will surpass all previous years in variety of models and in new additions of old and popular brands. Travelers will offer, in addition to bicycles, a varied line of standard sundries at attractive quotations.

The New York Six-Day Race

The annual six-day cycle race at Madison Square Garden started Sunday night. The management had scoured Europe for good competitors and has secured a field which is regarded as the best ever seen here or in any other country. The laws of New York do not allow the promotion of a race in which the men are required to ride more than 12 hours continuously, so the event is for teams of two men, who relieve each other as they please. The teams which started were as follows:

Gougoltz and Simar, of France; McFarland and Freeman, of California; Munro and Newkirk, of Memphis, Tenn; Babcock and Turville, of the Century Road Club Association; De Roeck and Kerff, of Belgium; Fisher and Chevalier, of Switzerland and France; Le Poutre and Muller, of Italy; King and Samuelson, of Salt Lake City; Furtos and Peterson, of Cleveland; Lawson and Julius, of Sweden; Karnstadt and Franks, of Vienna; Walthour and McEachern, of Georgia and Canada; Norcotte and Jones, of New York; Hall and McLaren, of England; Maya and Wilson, of Pennsylvania; Frederick and Jaak, of Germany, and Butler and McLean, of Boston.

Among former six day competitors who will be missed from the ranks are C. W. Miller, Frank Waller, Burns Pierce and Frank Albert.

Up to date the race has been remarkably close. The attendance has been good, as it always is. Unfortunately the French team, Gougoltz and Simar, retired the first day. The former fell and injured his knees. Simar quarreled with his trainer and refused to ride. The management then announced the retirement.

The score at 8 o'clock on Wednesday was as follows:

TEAMS.	MILES.	LAPS.
Fischer and Chevallier	1,100	0
Butler and McLean	1,100	0
Newkirk and Munro	1,100	0
MeEachern and Walthour	1,100	0
Maya and Wilson	1,100	0
Lawson and Julius	1,099	9
King and Samuelson	1,099	8
Babcock and Turville	1,099	9
Fredericks and Jaak	1,099	7
Hall and McLaren	1,099	7

Olive Wheel Co. Bankrupt

The course of the Olive Wheel Co., of Syracuse, has been erratic in the extreme for the last 12 months. It has not made an attempt to manufacture bicycles lately, and creditors and others have been unable to obtain as much as an answer to their requests for settlement or an explanation of the condition of affairs. The result is that the company was sued by a number of creditors and now has been adjudged bankrupt. The company was ordered to appear before the referee in bankruptcy last week.

On the occasion of the Japanese emperor's birthday a number of races were held at Yokahama. Among the events was one for motor cycles, won by a Thomas Auto-Bi, a similar machine being second and a Gladiator quadricycle third. The distance was 2 miles and the time 5:25.

CLASSIFICATION OF RACING VEHICLES

A question which has already caused a lot of discussion and will cause a lot more is the classification of gasoline vehicles in races and other contests. Up to date there have been two classes of events, one in which, as at Newport and Providence, the machines were classified by horsepower, and the other in which they were classified by weight. Neither proved satisfactory. There was no method of testing the power and in the weight class some competitors claimed that they were handicapped by reason of greater weight, in proportion to power, than was carried by other competitors, which was, of course, true. The prospects are that no solution satisfactory to all will be reached speedily. Many people claim that weight per horsepower should be considered—an ideal solution if one could but be certain of the power. In an interview last week Mr. Bostwick stated—as is unquestionably true—that in framing the rules the A. C. A sought the best interests of the trade. Perhaps absolute honesty may be considered conducive to the best interests of the trade. In that event it might be well to couple the catalogued weight and power! Makers are prone to exaggerate the power and understate the weight. For a splendid example see the results of the Nelson Hill contest. In that event the average weight of nine American gasoline vehicles was 1498 pounds. The average horsepower was within a small fraction of 8. The average time was 5 m., 21 1-3 s. Taking weight and power into consideration the Columbia, rated at 4½-horsepower, should have carried only 855 pounds, instead of 1700, as stated by the catalogue. No other vehicle could compare with it, taking this important comparison into consideration. The American vehicle which made the best time weighed 1050 pounds, but, in keeping with its power, should have weighed 1520 pounds. The next weighed 1700 pounds and should have weighed 2280 pounds. The question arises, is the power of the Columbia more than stated or that of the others less? If the makers care anything about the results of racing the acceptance of catalogue weights and power might prove advantageous.

Mr. Bostwick believes that the greater power a maker can place in a certain weight, the better. Perhaps so—for racing machines. But it is questionable whether the same rule will apply to machines for every-day use in which, after all, durability and stability are of greater importance than great speed. Mr. Bostwick's ideas are here set forth:

"I have noticed more or less discussion in the papers relative to the classification of vehicles," said Mr. Bostwick, "and it is perhaps only fair that I should offer the reasons for the rule that is most favored by the race committee of the club. Frankly, the only reason why we decided upon weight as the proper medium to classify vehicles is because there is no other ruling that could be made and enforced properly.

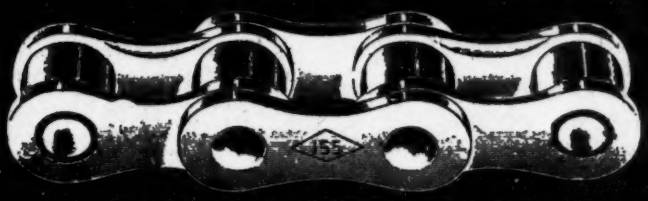
"Generally speaking, it is impossible to learn the exact horsepower of a gasoline vehicle. Steam carriages could easily be classified according to horsepower, but with gasoline carriages we can figure out only the efficiency of the motor, and this same efficiency might be increased largely by the operator before the race started. Whenever the exact horsepower of a gasoline motor can be figured, we shall certainly advocate a consideration of horsepower as well as of weight.

"To do the industry the greatest good, apart from increasing interest in the sport itself, is one of the many objects of the automobile club. Rules that we have adopted are enforced solely with these objects in view. Fairness is an essential feature of sport, and in promulgating rules for the government of automobile racing, we have and always will figure so that all concerned will receive fair treatment.

"The race committee decided only after careful consideration to classify gasoline carriages according to weight. If a manufacturer can produce a machine of 2,000 pounds that will furnish 40-horsepower, he should be entitled to his advantage over the maker that can get only 20-horsepower within his weight. To handicap the build-

CHAIN TRANSMISSION OF POWER IS SATISFACTORY

ONLY when frictional rivet surface and tensile strength are large in proportion to the working load.



NO. 155 FOR LIGHT RUNABOUTS

Equip your machines with large chains and avoid trouble. *Diamond Chains* have large nickel steel hard rivets, are accurate and highly finished.

The Automobile and Cycle Parts Co.

DIAMOND CHAIN FACTORY

INDIANAPOLIS, IND.

THE Victor Steam Carriage

Automatic Water Feed.

Steam Air and Steam Water Pumps.

Steel Body.

Feed Water Heater.

Fusible Plug to Cut off Fuel when Water is Low.

Enclosed Engine.

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OVERMAN AUTOMOBILE COMPANY, 81 Fulton Street, **NEW YORK**

SALESROOM, 31 EAST 32ND STREET, NEW YORK.

er of the 40-horsepower machine certainly would handicap the industry to a large extent. Then, too, tires can stand safely only certain weights, and with the present classification the tendency will be to reduce the weight of vehicles as much as possible without reducing the horsepower. This will result in the production of light weight carriages of high power, which should be the aim of every manufacturer.

"Incidentally, I might say that automobile manufacturers with whom I have talked seemed well pleased with the weight classification rule, and until some good reasons are advanced for a change, we hardly can see where any better method can be adopted. Whenever we can learn the horsepower of gasoline engines, then the horsepower could certainly be considered. Until then, however, I think everybody will agree with the race committee that consideration of weight is the proper method of classifying vehicles. To be sure, a racing carriage when stripped has an advantage over a touring car, and this should be so, else what would be the inducements for manufacturers to spend time and money to produce fast carriages?

"As a proof that horsepower could not be considered in the classification of vehicles, I might say that at a recent tournament where horsepower was figured a carriage was entered as 9 horsepower that was known to have furnished 16 horsepower prior to this meet, and which had always been considered a 16-horsepower machine. It is possible to fix the engine so that on a brake test only half the real horsepower might be shown, so that to consider the power at this early date would open up an avenue for unfair dealing that would prove detrimental to the sport in general."

Believes in Eliminating Classification

The classification of racing vehicles according to their weight was the plan adopted for the endurance contest from New York to Rochester; it was also adopted within the gasoline vehicle division by the Long Island Automobile Club for the Coney Island races, and would have been extended to steam vehicles and electric vehicles if there had been enough of them to make the classification practicable. The same rule has been reaffirmed by the Automobile Club of America as governing for future races. Meanwhile, it is asserted in other quarters, more technically inclined, that the proper classification would be by horsepower per pound or pounds per horsepower. Perhaps, however, the whole question of classification is a survival from other forms of sport, and one for which no good reason can be found in the aims and purposes connected with automobilism.

If there is any object in automobile racing it must apparently be that of determining the design and construction of the automobile vehicle which will go fastest. The chauffer's ability is a factor only, because it enters unavoidably in the decision. The chauffer's ability is furthermore a factor which has nothing to do with weight and horsepower; it will play its part independently of all classification.

As for dangers by collision on the course of races, it matters very little whether a 3,000-lb. machine collides with a motor bicycle or with another 3,000-lbs. machine. At 60 miles per hour the results are likely to be as fatal in one case as in another.

As for speed possibilities it has been shown repeatedly that motor cycles and very light automobiles may reach so near to the speeds of high-powered road locomotives, that it cannot possibly be considered decided which type will ultimately prove the faster. The same may be said of all intermediate weights, styles, types and powers. The question of racing speeds is an open one. To consider it closed by considerations of weight or of power, or both, is to remove from the sport of automobile racing the greatest part of the remnant of intelligent interest which still may attach to it.

If the builder of a 10-horsepower vehicle finds that he cannot compete with a 30-horsepower vehicle on the race track, let him change his construction or let him desist from the racing for which he is not qualified and strive for other things than extreme speed. To be a second-rater in a speed trial is, after all, a trivial and unsatisfactory position, to the second rate racer as well as to the public who are compelled to witness his impotent struggles if they wish to see the first-rater in the same event.

How much greater would be the popular interest in an automobile race if everything were left open, and it was admitted that any weight and style of automobile

A List of Headings to be Used in the Motor Age

Automobile Directory

Makers Who Have Not Sent Details are Requested to Mark the Items They Manufacture and Send at Once to Motor Age, Monon Building, Chicago.

Automobiles, freight :
Automobiles, light delivery :
Automobiles, electric :
Automobiles, steam :
Automobiles, gasoline :
Ammeters and voltmeters :
Alarms, low water :
Asbestos cement :
Accumulators :
Axles :
Burners, kerosene :
Burners, gasoline :
Bearings, plain :
Brakes :
Brakes, double acting :
Bodies :
Boilers, tubular :
Boilers, fire tube :
Batteries, storage :
Batteries, dry :
Bearings, ball :
Bearings, plain :
Bearings, roller :
Bearings, ball thrust :
Balls, steel :
Bicycles, motor :
Bells :
Backs :
Binding posts :
Brazing compound :
Bolts and screws :
Burners, gasoline :
Coils, induction :
Coils, spark :
Cement :
Carbureters, other than surface :
Carbureters, surface :
Crank cases :
Cranks :
Charging outfits.
Controllers, electric :
Condensers :
Converters :
Chemical heaters :
Castings, aluminum :
Castings, bronze :
Castings, steel and iron :
Castings, brass :
Clothing :
Cushions :
Cylinder oilers :
Color and enamel :
Coaster brakes :
Charging outfits, electric :
Case hardening material :
Chains :
Dynamos :
Dynamotors :
Dashes :
Drive gates, automatic :
Engines, steam :
Engines, kerosene :
Frames :
Fenders :
Forgings, drop :
Forgings, rolled :
Frames, motor bicycle :
Fringes :
Glasses, water :
Glasses, gauge :
Gears, compensating :
Gears, steering :
Gears, two-speed :
Gears, differential :
Gears, transmission :
Gears, reversing :
Gears, running :
Gears, bevel :
Gears, two and three-speed :
Gear wheels :
Grease :
Grips, for steering bars :
Goggles :
Gauntlets :
Generators :
Grease cups :
Gradometers :
Gearing, spiral :
Gauge cocks :
Gauges, tank :
Gauges, gasoline :
Gauges, steam :
Graphite :
Heaters, feed water :
Horns :
Hydrometers :
Hubs :
Handles, steering :
Ignition devices :
Injectors :
Jacks, lifting :
Joints, flexible :
Lamps, oil :
Lamps, gasoline :
Lamps, acetylene :
Lamps, electric :
Lamps, water gauge :
Lubricants :
Leather tool cases :
Lace, carriage :
Locks :
Leather substitutes :
Leather cloths :
Matting, rubber :
Mufflers :
Motors, electric :
Motors, gasoline :
Mirrors, for steam carriages :
Magnetos :
Machinery and tools :
Mud guards :
Nipples :
Name plates :
Odometers :
Oil, motor :
Oil cans :
Oil, lubricating :
Oil cloth and oil carpet :
Oilers :
Oil cups :
Oil hole covers :
Plug switches :
Plugs, spark :
Pinions :
Pilot lights :
Pipe joint compound :
Panels :
Pet cocks :
Pumps, steam power :
Pumps, tire :
Pumps, water, steam actuated :
Pumps, water, auxiliary :
Pumps, water, hand-power :
Pumps, air :
Pumps, oil :
Packing, rubber :
Plugs, fusible :
Quadricycles, motor :
Radiators :
Rims, wood :
Rims, steel :
Rivets, tubular :
Robes :
Regulators, water level :
Regulators, gasoline :
Sprockets :
Spokes, wood :
Spokes, steel :
Spokes, tubular :
Shells, seamless tube :
Stampings, sheet metal :
Seats :
Speedometers :
Screws, nuts, etc. :
Springs :
Springs, for motors :
Seats, attachable :
Spark plug porcelains :
Steering knuckles :
Steps :
Tools :
Tandems, motor :
Trimmings :
Tires, pneumatic :
Tires, mechanical :
Tires, solid :
Tire covers :
Tanks, air :
Tanks, gasoline :
Tanks, water :
Tricycles, motor :
Tops :
Tank fillers :
Tire repair tools :
Try cocks :
Tubing, steel :
Tubes, boiler :
Top levers and springs :
Torch heaters :
Threads, silk and trimmings :
Valves :
Varnishes :
Vaporizers :
Valve stem eyelets :
Valves, mixing :
Valves, tire :
Valves, throttle :
Valves, safety :
Wrenches :
Whipcords, twine, etc. :
Washers and bushings, mica :
Wheels, motor :
Wheels, tubular :
Wheels, wood :
Wheels, wire :

Name _____

Address _____

might prove the dark horse which would win the trophy.

If the omission of all classification should lead to a monopoly for heavy, high-powered machines in racing events, there would probably be so many more of this class and the popular interest would be more than maintained; but it seems more likely that it would lead to an energetic development along new lines of construction for all classes of automobiles to bridge the small gap which now separates the speed of the voiturette from that of the leviathans.

Only by such unclassified racing would it be possible also to reach convincing conclusions in regard to the effect of wind and road conditions on the various types of vehicles.—Automobile Topics.

THE MILWAUKEE DELIVERY WAGON

The illustration shows the delivery wagon made by the Milwaukee Automobile Co., for Schlesinger & Mayer, the famous Chicago dry goods house. A brief description of the wagon appeared in last week's issue.

A Fluke

May cause a motor vehicle to make a good showing on a single occasion, but when an automobile stands up and wins five days in succession, it most certainly demonstrates the absence of accidental victory. And when four vehicles stand up and win five days in succession, covering each nearly one hundred miles in a day and being awarded the highest honors at the finish, the charge cannot be supported, in the minds of reasonable men, that the triumph was not brought about by intrinsic merit.

Four first awards were given four WHITE steam carriages for their work in the New York to Buffalo Endurance Contest, promoted by the Automobile Club of America, whose official report can be secured from us, free of charge, upon request. Get a copy and draw your own conclusions from its recitals.

White Sewing Machine Co.

(Auto Dept.) **CLEVELAND, OHIO.**

...NOTE...

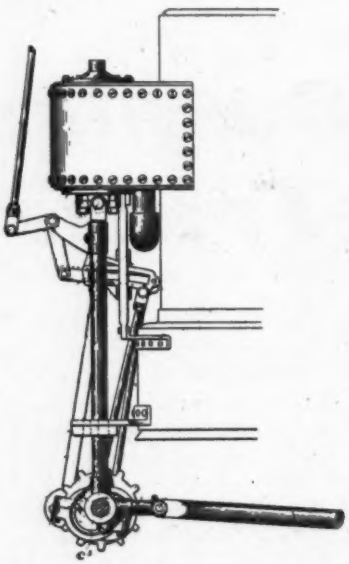
There will be a special exhibit of White steam carriages at the New York branch office of the White Sewing Machine Co., 22 Union Square, where all interested parties are cordially invited to call and inspect the vehicles.

...BRANCHES...

22 Union Square, New York, N.Y. 509 Tremont St., Boston, Mass. 212 Woodward Ave, Detroit, Mich
360 Post Street, San Francisco, Cal. 609 Main Street, Buffalo, N. Y.

LATE EFFORTS OF DESIGNERS

George E. Whitney, of Boston, is the inventor of an engine for steam driven vehicles, which possesses several novel and advantageous features. The most noticeable is the construction which provides for flexibility in the frame and enables the cylinders to be rigidly attached to the boiler, thus furnishing a solid foundation to absorb the vibration incident to the reciprocating action of the pistons. Located on and preferably part of the bottom cylinder heads are depending lugs, to which are pivotally at-



tached, at their upper ends, the movable or swinging frame tubes, provided at their lower ends with bearings in which the crank shaft is journaled. These frame tubes constitute the movable portion of the engine frame. The crank shaft is of the usual construction, and is held in proper location in relation to the rear axle by the usual distance or tension rods.

The pivotal point of the bell-crank, that operates the links, is located so far to one side of the vertical pivotal line of the movable frame that any horizontal movement of the crank shaft causes the angle of the bell-crank to rise and fall, and its short arm at the end of the reversing rod acting as a fulcrum, the lower end of the bell-crank moves in a direction opposite to the movement of the crank-shaft and moves the links just enough to neutralize that motion.

Another feature of the engine is its method of attachment to the boiler. A vertical tubular boiler, of the type in general use, is provided with a lateral extension, near the top, within which are secured the cylinders and valve mechanism. The surrounding portion of the above projection acts as a steam box and the cylinders thus arranged are kept hot by steam from the boiler which enters the surrounding extension or jacket, thus practically eliminating condensation and its attendant unpleasant consequences.

Patents an Impossibility

In nearly every branch of mechanics there exists some device which appears periodically in more or less promising form, but never develops to the point of success. In the automobile industry it promises to be the four-wheel drive, and the number of devices of this sort already presented is far in excess of the need for such a form of construction; but as there are plausible theories as to the advantages accruing the end is probably not yet. The latest device of this sort is that of Elijah E. Steele, of Wallingford, Conn.

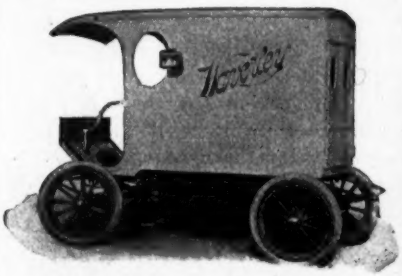
The distinctive feature is a longitudinal driving shaft, extending from axle to axle and fitted with a bevel gear at each end, which gears mesh with differential gears located at the center of the axles. The driving connection between the motor and this shaft may be of any form desired, that shown in the illustration being by bevel gears in the center of the shaft, which gears mesh with a bevel gear on a secondary shaft driven by a reducing gear from the motor. With this form of connection the longitudinal shaft is, of course, in two parts, as the bevel gears will run in opposite directions.

The connection with each of the wheels is by means of a set of three bevel gears. Pivoted above and concentric with the pivot of the steering knuckle is a bevel gear meshing at one side with a gear on the

Waverley

ELECTRIC DELIVERY WAGONS

are easily distinguished because of their attractive distinctive lines. Those exhibited at the Madison Square Garden Show attracted the attention of every one interested in the subject of electric deliveries. Of handsome appearance and fancy lines and possessing an ample interior capacity, they demand an examination by all interested in this style of delivery conveyance.



Delivery Wagon—Model No. 23.

DESCRIPTION:

WEIGHT.—1,850 pounds.

BODY.—Carrying capacity space: Length, 4 feet 2 inches; width, 3 feet: height, 4 feet 2 inches, inside; height from ground 25 inches; wheel base, 80 inches.

WHEELS.—Wood, 30 inches diameter; 3½ inch pneumatic tires.

MOTORS.—The motors (2) are of a new and improved design, of a normal capacity of 4 H. P. each, also capable of an overload of 4 H. P. each additional. Speed from 5 to 15 miles per hour.

GEARING.—The gearing is of the "herring-bone" type, protected by dust-proof cases and runs in oil.

INSTRUMENTS.—Each vehicle is equipped with a combination volt and ammeter.

BATTERY.—The Sperry Battery is used; weight 600 pounds.

Price

$1,400

AMERICAN BICYCLE COMPANY,

WAVERLEY AUTOMOBILE DEPT.

Indianapolis, Ind.

NEW YORK BRANCH. 91 FIFTH AVENUE.

Cycle Makers Tried for

A

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of a

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Before they were able to make a machine as light as those of to-day and guarantee them as comfortable and reliable. The

Cushion Frame

was the missing link between comparative and absolute comfort. It not only saves the rider but it saves the machine. It checked the downward course of prices, made it possible for the dealer to ask a good price and at the same time

Satisfy His Customers

A satisfied customer is the best recommendation. The Hygenic Cushion Frame satisfies everybody.

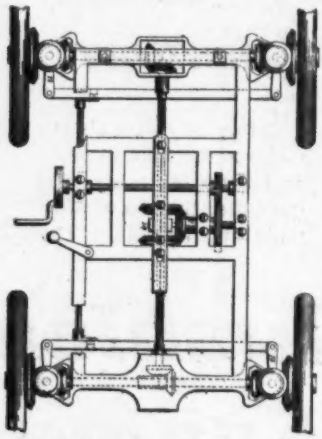
HYGIENIC WHEEL CO.

St. Paul Building,

NEW YORK

end of the shaft extending from the differential. The other side of the first mentioned gear meshes with a bevel gear attached to the hub of the wheel, which arrangement permits the wheel to be swung around the pivotal gear for steering.

It is right at this point that the inspired inventor fails. He has, or expects to have,



three bevel gears of different diameters, meshing together, with the axial lines at right angles to each other—an impossibility, of course.

Going many of his predecessors one better, the designer has not only attempted to provide for driving by all four wheels, but to steer by both front and rear wheels.

Orswell Sparking Plug

A sparking plug recently designed by L. C. Orswell, of Cambridge, Mass., has the appearance of effective construction and the added feature of economy in manufacture. The plug, or portion screwing into the combustion chamber of the motor, has a concaved inner end and is taper bored to receive an insulating bushing of mica or other nonconducting material surrounding the tapered electrode to which is attached the secondary wire from the coil. Surrounding the electrode above the threaded portion of the plug are superposed disks of mica, held in place by a hexagonal nut, screwed on the end of the electrode. The seating of this nut tends to draw the tapered electrode firmly into the plug, thus making a gas-tight joint.

Above the nut above mentioned is a binding nut for securing the wire from the coil. This nut has on its outer surface a tapered sleeve split and threaded to receive a jam nut which has a tapered, screw tapped aperture and is adapted to be screwed down on to the sleeve, thus locking the binding nut and preventing it from becoming loosened. Seated in the inner face of the plug is a wire electrode with the inner end bent toward the tapered electrode above described.

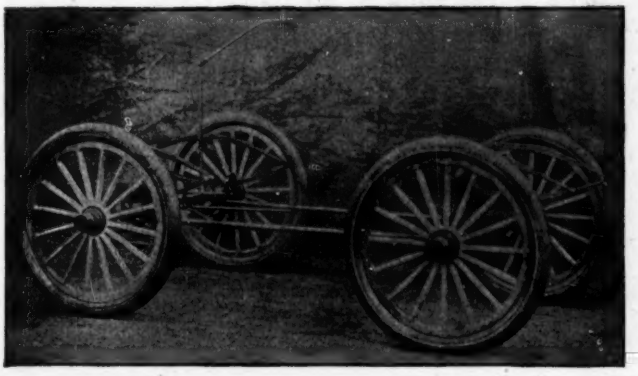
The advantages claimed for this plug are the absolute avoidance of leakage and the ease with which it may be taken apart. The concavity of the inner face of the plug is also advantageous, since it increases the distance between the metal portion of the plug and the inner end of the insulated electrode.

A new speed meter will shortly be placed on the market by the Veeder Mfg. Co., of Hartford, which it is expected will prove a valuable adjunct to every automobile. It will automatically register the exact speed at which a vehicle travels and can be readily seen from the seat.

Attention is called to the fact that the Adams-McMurtry Co., which conducts the New York agency of the Packard and a general automobile business, has removed from its old quarters to 317-319 West Fifty-ninth street.

The Desberon Motor Car Co., of New York, has sold the 3-ton steam truck exhibited at the recent show, to a South American Mining Company, which will use it for transporting ore.

Automobile Running Gears



Get a running gear that is past the experimental stage and build a SUCCESSFUL AUTOMOBILE

We make two styles complete with springs and wood wheels, solid rubber or pneumatic tires. ∴ ∴ ∴ ∴ ∴

OUR SPRING BLOCK BEARING IS SELF-ADJUSTING

and you ought to have it. It is made for revolving axles and is pivoted between the bearing and spring block, enabling the bearing to move free and easy with the axle always. Our catalogue tells all about it. ∴ ∴ ∴ ∴ ∴ ∴ ∴ ∴ ∴

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Is Justified by Actual Demonstration

It has carried off the honors wherever shown.
Not alone the best by performance but conceded the handsomest, most graceful, easiest controlled and most reliable American built carriage.

First of gasoline vehicles, Merrick Road, March, 1900.
Blue Ribbon—Long Island Endurance Test, April, 1901.
First prize, Guttenburg, N. J., September, 1900.
Winner of every contest for gasoline vehicles at New York and Philadelphia automobile shows. These contests include starting, stopping and obstacle events.
First prize, Newport, September, 1901.
NEW YORK-BUFFALO ENDURANCE RUN—Two first class certificates.
Silver Cup, Providence, October 18, 1901.

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Automobile Company of America, 135 Broadway, NEW YORK.

Factory: Marion (Jersey City) N. J.

SPECIFICATIONS OF TWO-PASSENGER STEAM AUTOMOBILES.

Mrs. L. M. Adams, of Houston, Texas. is probably the best posted woman on the subject of steam automobiles in the world. She is an agent, covering the whole of Texas, and knows more about the machines she handles than nine men out of ten. Mrs. Adams has previously contributed interesting and instructive material to the columns of this paper and now sends the appended table of steam vehicle specifications which are not to be found in the catalogues of the makers. This information she obtained from the makers direct. Mrs Adams explains that the fact that some machines are not mentioned is due to the failure of the makers to respond to her inquiries:

NAME	Boiler	Diam. of Boiler	No. of Tubes	Size of Tube	Metal of Tubes	Heating Surface	Engine	Horse Power	Bearings	Wheel	Track	Steering Device	Brake	Generator	Top	Lamps	Lock for Carriage
Locomobile.....	Copper, wire wound	14 in.	298	½ in.	Copp'r	44 sq. ft.	Diam. 2½ in. stroke 3½ in.	3½	Ball	2½x28 Wire	4 ft., 6 in.	Side or Center	Dbl.	Torch, Pilot, as order'd	As order'd	Gas, Gasoline or Kerosene as ordered	Lock between steam chest and engine
Mobile.....	Copper shell, steel heads	14 in.	296 Fire — 2 Gas.	½ in.	Copp'r	44 sq. ft.	Diam. 2½ in. stroke 3½ in.	3½	Ball	2½x28 Wire	4 ft., 6 in.	Side or Center	Dbl.	Torch, Pilot, as order'd	As order'd	Gas, Gasoline or Kerosene	Throttle Lever
Stearns.....	Steel	14 in.	300	½ in.	Copp'r	50 sq. ft.	High P. cylinder 2x3½ in. Low P. cylinder 3x3½ in.	2¾ Com. 5 Simple	Ball	2½x28	4 ft., 8 in.	Side	Dbl.	Kelly	As order'd	Dietz or Lockwood as ordered	Globe valve under engine
Toledo.....	Shell water tubes, superheated	19 in.	8	⅝ in.	Steel 20 & 16 gauge	34 sq. ft.	Diam. 3 in. Stroke 4 in.	7 7/10	Ball & Plain	3x28	Standard	Center	Dbl. Band	Pilot-light	As order'd	Gray & Davis	Throttle Lever
Reading.....	Steel	16 in.	380	½ in.	Copp'r	55 sq. ft.	4 cyl. rot. valve	5¾	Roller	2½x30	4 ft. 6 in.	Side	Dbl.		As order'd	Carriage Pattern	Yes
Grout.....	Copper	14 in.	300	½ in.	Copp'r	45 sq. ft.	Locomotive type link motion	5	Part Ball	2½x28 & 30 in	4 ft., 8 in.	Center	Dbl.	1 Piece with Steel Tube	As order'd	As ordered	Yes
Foster.....	Steel top, seamless drawn, bottom rivet'd	16 in.	400	½ in.	Copp'r	65 sq. ft.	Diam. 2½ in. Stroke 3½ in.	3½	Steel	2½x34	4 ft., 8 in.	Side	Dbl.	Over Fire & also Pilot Light	As order'd	Oil or Gas as ordered	An auxiliary throttle
White.....	Steam Generating Coil 250 ft. in length. 12 Coils—9 lower coils of seamless steel tubing, 3 upper coils of copper, Diam. of coil 11 x 14.					30 sq. ft.	Diam. 3 in. Stroke 3½ in.	6	¾ in. Ball	3x30	4 ft., 8½ in.	Center	Dbl.	White	Tops on all	Dietz	No

New Kelly Generator

For Steam Vehicles
Improved—Perfect in Every Way

Drip cup unnecessary in starting—Aluminum case over generator—All connections on the outside—Strongly made—Easily adjusted—No flaring or flashing in lighting, even in strong wind. A quick and powerful generator—Main fire valve controlled at seat—Small and neat in appearance and adapted for any machine.

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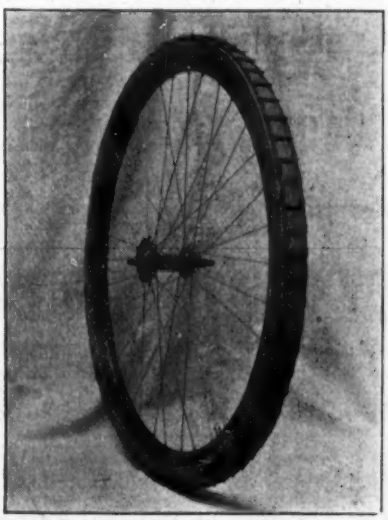

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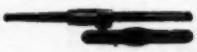

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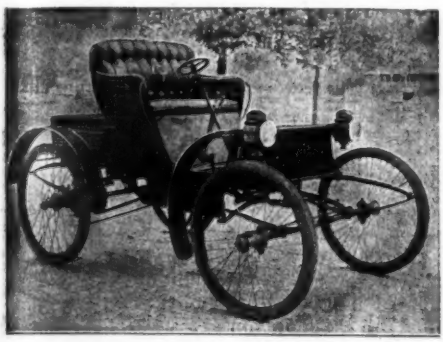

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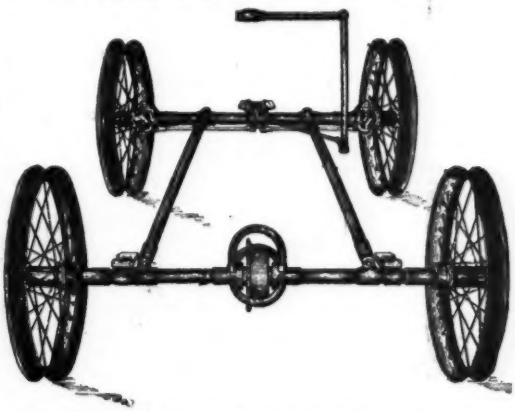

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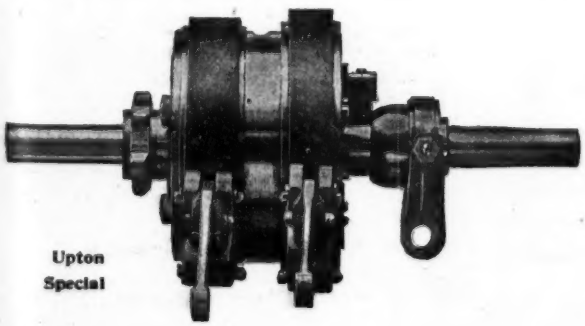

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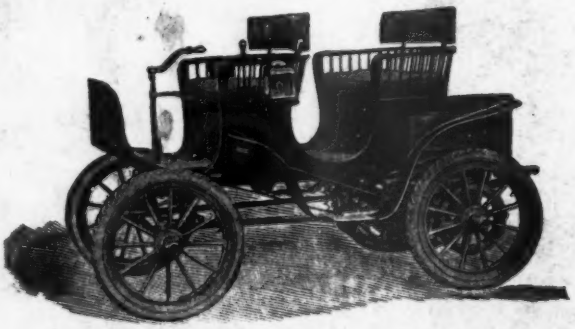

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